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12TH ANNUAL NEW FOOD PLANT CONSTRUCTION

FOOD ENGINEERING

COVER STORY

Food Engineering's 12th annual new plant survey shows that the food industry construction boom is continuing with a record 390 plants reported, up from 369 last year.

Pages 64 to 82

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POSTMASTER: Send form 3579 to Food Engineering, Post Office Box Number 2035, Radnor, PA 19089.

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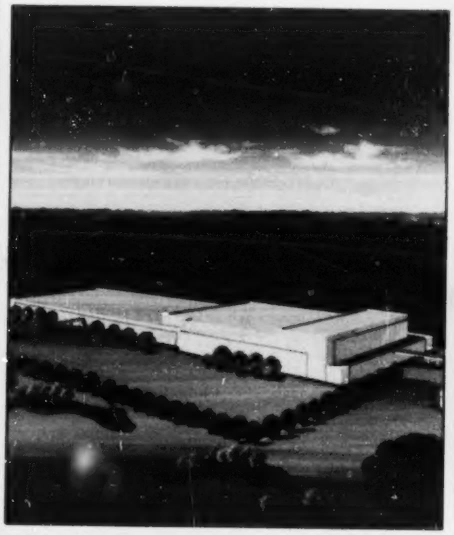

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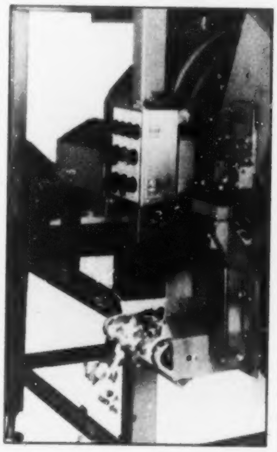

Special Emphasis

INSPECTION AND MACHINE VISION

Significant improvements in machine vision sales may result because of the food industry's need to compete globally.
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Americans expected to increase food spending as they get older

Food consumption
(adult daily intake, in grams)

Males:	Grams/ day	% change
Age 19-22	2,008	–
Age 23-34	2,143	+6.7
Age 35-50	2,193	+2.3
Age 51-64	2,175	−0.8
Age 65-74	1,969	−7.5
Age 75+	1,894	−3.8
Females:		
Age 19-22	1,560	–
Age 23-34	1,719	+10.2
Age 35-50	1,780	+3.5
Age 51-64	1,807	+1.5
Age 65-74	1,694	−6.3
Age 75+	1,526	−9.9

Sources: United States Department of Agriculture; Nationwide Food Consumption Survey.

The above graph illustrates the fluctuations in eating habits by gender and age. Notice the largest increases in food intake occur as both men and women enter their thirties with the tapering off rate differing by sex.

"Changes in age distribution are likely to have the biggest impact on per person food demand," said James R. Blaylock, agricultural economist with the U.S. Department of Agriculture (USDA) in *Demographic Directions*, published by The Food Institute of Fairlawn, NJ. An aging populace will have a dramatic impact on the food industry because as people get older they spend more money on food. The report added that regional population distribution changes and changing racial mix will have little or no impact on future food demands.

USDA figures show that Americans eat more as they get older. The Nationwide Food Consumption study demonstrates that males aged 23-34 eat 6.7 percent more food than men in the 19-22 age bracket. Women aged 23-34 consume 10.2 percent more than those in the 19-22 age bracket. While men continue to show food intake increase up to age 50, women show an intake gain right up to age 64.

35-54 year old affluent

Another finding of the report was that affluent household groups in the 35-54 age range spend more on food than other groups. In addition to having larger incomes to dispose of, 35-54 year olds also tend have more mouths to feed since they are commonly married with children.

Meanwhile, on the lower side of the age spectrum, consumers in the under-25 age category comprise only 5.8 percent of all households. This group accounts for fewer households because more than half of the people aged 18-24 still live at home with their parents. Young people are putting off marriage which also accounts for fewer households within the under-25 category. The average age for first-time marriages has rolled back an average of two years over the last decade. In 1988, the average first marriage for a female was 23.6 and 25.9 for males. Approximately 17.6 percent of the under-25 income is spent on food: 10.9 percent at home and 6.6 percent away from home.

The biggest block

In contrast, the 25-34 year olds comprise the largest single block by age, accounting for 22.4 percent of all U.S. households. All members of this group are official "baby boomers." Approximately 11 percent of them live at home with their parents as of 1988, up from 9 percent in 1980. On the average 25-34 year olds have double the income of the under-25s and have more children to feed. However, spending for food accounts for only 13.3 percent of their income: 9 percent at home and 4.3 percent away.

More food dollars flow from the 35-44 year old bracket than any other. This group comprises approximately 20.9 percent of all households and two-thirds of these families are comprised of the traditional married-couple variety. Approximately 12.4 percent of the 35-44 year olds had combined after-tax income of $40,000 or more in 1984 with approximately 14 percent spent on food: 9.8 percent at home and 4.3 percent away.

Continued gains are projected for food spending by this group with expenditures expected to escalate from 1987's $66 billion to $82.27 billion in 1995. The share of at-home spending is projected to grow from 1987's 27 percent to an estimated 30.1 percent in 1995.

Members of the 45-54 year old cohort are expected to spend $58.7 billion on food by 1995, up from $44.25 billion in 1987. At-home spending by this group is expected to gain from 18.1 percent in 1987 to 24.2 percent by 1995. Away-from-home expenditures are expected to grow almost as much as at-home spending from $30.81 billion in 1987 to an estimated $42.87 billion in 1995. Food marketers should note that present-day members of the thirty-something crowd will be full-fledged members of the 35-44 and 45-54 year old groups, which combined will have over half the food purchasing power by the year 2000.

At-home food expenditures begin to drop with the 55-64 year old group with 1987 spending of $37.16 dropping to a projected $34.44 billion in 1995. However in the period from 1995 through 2000, 55-64 year old households are expected to increase at-home expenditures from the estimated $34.33 billion in 1995 to a projected $39.20 billion by 2000.

Between 1987 and 1995, the number of households of 65-74 year olds is expected to grow modestly to increase 1987 at-home food expenditures of $25.67 billion to an estimated $26.79 billion by 1995. Growth in this age category is expected to drop from 1995 to 2000 by one percentage point to a projected $25.6 billion by 2000.

Over 50 percent of the 75+ households are comprised of single persons. At-home food spending by this senior group is expected to dramatically grow from $13.94 billion in 1987 to a projected $17.49 billion by 1995. Seventy-five plus households will outspend the under-25 group by almost three-to-one by 1995.

For further information on this study, contact The Food Institute, 28-12 Broadway, Fair Lawn, NJ 07410.

Research survey shows consumers prefer multi-packing for cans

Purchase habits for canned vegetables

Frequency of purchase	
Once a week or more	39%
Once every 2-3 weeks	37
Once a month	19
Once every 2-3 months	3
Base:	201
Sizes usually purchased	
Small/single serving (eight ounces or less)	17
Medium/regular size (nine- to 16-ounce)	76
Large/family size (over 16 ounces)	12
Multiple responses Base:	201

Source: Elrick and Lavidge, Inc.

As seen in this chart, canned vegetables are purchased regularly, where those surveyed (39 percent) said they purchase canned vegetables once a week or more often. Three-fourths of the users (76 percent) said they usually buy the medium/regular size can. Because some respondents claimed to purchase two sizes of canned vegetables equally, the totals displayed add to more than 100 percent. (Source: Elrick and Lavidge, Inc.)

According to a recent survey conducted in six major metropolitan markets, shoppers like the discounts and the carrying and stacking ease associated with multi-packed foods. The survey, conducted for the Can Manufacturers Institute, shows high levels of interest by consumers in multi-packed cans of pet food, juice, tuna, soup, vegetables and fruit.

A total of 601 mall intercept interviews were conducted with consumers during May 1989. The interviews were conducted in six markets, selected on the basis of geographic dispersion: Atlanta, Baltimore, Denver, Chicago, Los Angeles, and metro New York.

Interviews were conducted with consumers who met the following criteria: 18 years or older, were the primary food shopper for the household, and did not work for an advertising agency, marketing research firm, a manufacturer or distributor of food products, or a package design firm. Consumers who had purchased one or more of the four key products in the past month were interviewed for the study.

The survey asked a series of questions designed to investigate consumers' ideas about the expected costs for various sizes and types of multi-packs. The results clearly showed that buyers expect a discount when purchasing canned food products in multi-packs. Consumers also expect that the more cans included in a multi-pack, the lower the price per can will be. Findings from questions regarding expected cost for the various packaging alternatives also suggest that consumers expect to pay slightly more for variety.

The Can Manufacturers Institute hopes to fuel this multi-packing buying trend with its *CANPACK* promotion, a new incentive program for processors of canned vegetables, soup, and pet food. CMI will award credits toward the purchase of multi-pack materials and/or equipment to qualifying processors. To earn credits, food processing companies must first sign up for the program and then increase their purchases of metal cans for vegetables, pet food or soup by specific amounts during a 12-month period beginning January 1990.

Can Manufacturers Institute, 1625 Massachusetts Avenue, N.W., Washington, DC 20036 **Circle 221**

Company acquires film operations

American Mirrex Corporation has announced its acquisition of Hoechst Celanese Rigid PVC Film Division, a major supplier of PVC packaging and technical films located in New Castle, DE. American Mirrex plans to expand and develop its rigid PVC film product lines for packaging and specialty applications on a worldwide basis.

The New Castle facility, with a 120 million pounds per year capacity, will continue under its current leadership. A new three-year contract with the local union will enable the organization to provide a continuous supply of products to its customers. Major customer applications for American Mirrex rigid PVC film include blister and clamshell packaging and shrink and label films.

New technology receives joint effort

The Eastman Chemicals Division of Eastman Kodak Company and the Airco Coating Technology Division of the BOC Group plc have formally agreed to work together to commercialize a new high-performance barrier for plastics packaging materials.

The new technology, *QLF*, is based on plasma enhanced chemical vapor deposition and has demonstrated the required performance for providing high barrier, transparent, recyclable coatings for bottles and films.

This new undertaking combines Airco's expertise in plasma enhanced chemical coating technology with Eastman's expertise in global packaging markets and technical services.

Eastman Chemical Products, Inc., P.O. Box 431, Kingsport, TN 37662
Circle 225

12TH ANNUAL NEW FOOD PLANT CONSTRUCTION

Food plant construction continues at a record pace for the fifth consecutive year. Take a look inside at who's building what, where and when.

Food Engineering's 12th annual new plant survey shows that the food industry construction boom is continuing with a record 390 projects being built, up from 369 reported last year. Results were compiled from a *Food Engineering* survey and data from Conway Data, Inc., Norcross of GA.

Approximately 193 or 49.5 percent of the projects are new construction, something of a decline compared to last year's 58 percent. However, compared to prior surveys, it is right on the norm.

Forty distribution centers were built, following a steady tack from last year's 35. Many of the distribution center/warehouses are freezer/refrigerated facilities illustrating that frozen food remains a powerful category. In addition, the upsurge in refrigerated and prepared fresh foods account for much of the refrigerated warehouse construction.

Cholesterol and calorie concerns are being addressed once again by the amount of poultry processing plants being built – 31. Still, activity continues to sizzle in the meat sector with the construction of 29 meat processing plants, up slightly from 27 last year. Meat plant construction in '88 and '89 was a dramatic departure from 1987 when only eleven red meat plants were built. This reinforces perceptions that the decline in demand for red meat has stabilized.

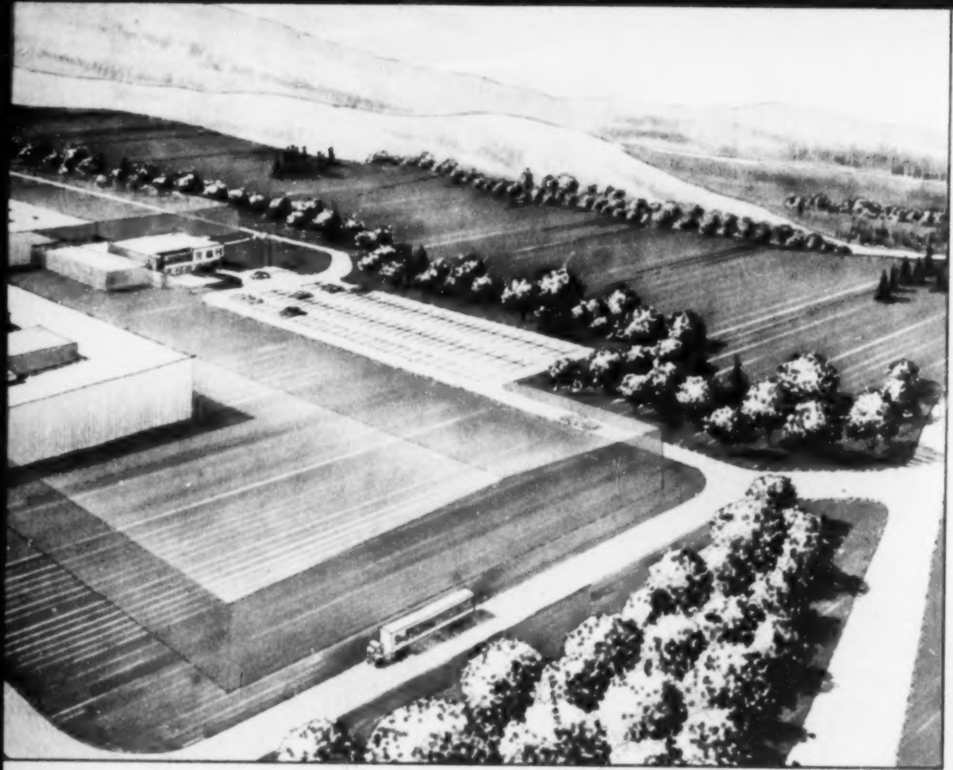
Pork "the other white meat" kept up with last year's trend with construction of three pork plants, one ham processing and one hog slaughterhouse. However, this has not been interpreted as good news by everyone within the pork packing industry.

Joseph W. Luter, III, chairman, president and chief executive officer of Smithfield Foods, Inc., said in the company's 1989 annual report, "Recent moves by several major players in the pork packing industry indicate that they are determined to increase their market share by significantly increasing their slaughtering capabilities in an industry which is already plagued by plant overcapacity. These actions by those companies will further pressure the weaker players in the industry and may result in a new round of plant closings and further consolidation of the industry. As a corollary to this scenario, we believe that fresh meat margins, which have been under pressure during our last fiscal year, will continue under pressure for the foreseeable future and that the short-term outlook for the industry remains cloudy."

Noteworthy projects that came to our attention after deadline included Nabisco's $30 million expansion of its cereal plant in Naperville, IL (Sverdrup) and Campbell Soup Co.'s 95,000 sq. ft. expansion in Camden, NJ (The Sigel Group & Ballinger).

In the final column of the following tables, project status and date are coded as follows: Plng. (site selected but construction not yet underway); Const. (construction underway); Comp. (project completed); and Stup. (actual or projected startup dates of new manufacturing plants).

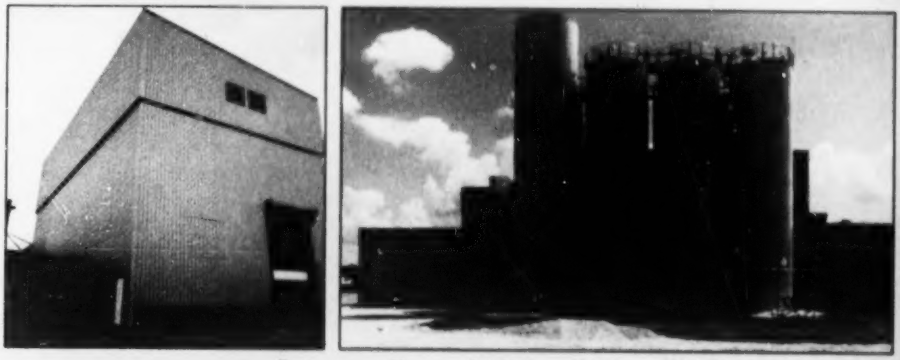
PATRICIA M. DILLON
Senior Associate Editor



Distribution centers were trendsetters in the survey and Hannaford Bros Co., plans to have a new grocery distribution center built in Schopack, NY in May 1990. (Source: St. Onge, Ruff and Associates, Inc.)

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employ-ees	Architects/ Engineers	Status & Date
A								
Advance Meat Co.	Enid, OK	Breaded meats	Exp.	–	–	150	–	Comp.
Advantage Food Prdts.	Petersburg, WV	Poultry proc.	New	–	1.1	280	–	Comp.
Aero-Span Feeders, Ltd.	Hereford, TX	Grain sorghum	New	20	.50	–	–	Const.
Alabama Feed Products	Cullman, AL	Pet food	Exp.	15	5.2	13	–	Const.
Albertson's, Inc.	Brea, CA	Groc. dist.	Exp.	345	12.7	35	A. Epstein & Sons Inc.	Comp. 5/89
Albertson's, Inc.	Brea, CA	Meat & deli warehouse	Renov.	24	–	–	A. Epstein & Sons Inc.	Comp. 12/88
Albertson's, Inc.	Roseville, CA	Grocery & prod. dist.	New	278	18.3	40	A. Epstein & Sons, Inc.	Comp. 9/89
Albertson's, Inc.	Boise, ID	Sundries ctr.	Exp.	54	–	–	A. Epstein & Sons Inc.	–
Albertson's, Inc.	Gresham, OR	Distribution ctr.	New	551	23.5	25	A. Epstein & Sons, Inc.	Comp.10/88
Albertson's, Inc.	Fort Worth, TX	Distribution ctr.	New	730	30.5	55	A. Epstein & Sons, Inc.	–
Albertson's, Inc.	Salt Lake City, UT	Perishable goods dist.	Exp.	64	4.2	10	A. Epstein & Sons Inc.	Comp.11/88
Alltech	Nicholasville, KY	Yeast	Exp.	–	1.3	15	–	Const.
Alpo Pet Foods	Crete, NE	Pet foods	Exp.	30	2	20	A. Epstein & Sons, Inc.	Const.
Alpo Pet Foods/ Jim Dandy Co.	Decatur, AL	Dog food	Exp.	100	2.5	–	–	Const.
Amber Milling-Harvest States	Hammond, IN	Flour	New	–	18	50	–	Plng. 12/90
American Crystal Sugar	Grand Forks, MN	Sweetener	Renov.	–	–	–	C.W. Nofsinger	–
American Fructose Corp.	Dimmitt, TX	Corn syrup	Exp.	–	30	–	–	Plng. '90
American Italian Pasta Co.	Excelsior Springs, MO	Pasta	Exp.	–	10	–	–	Const.
American Maize	Dimmitt, TX	Fructose	Exp.	–	30	–	–	–

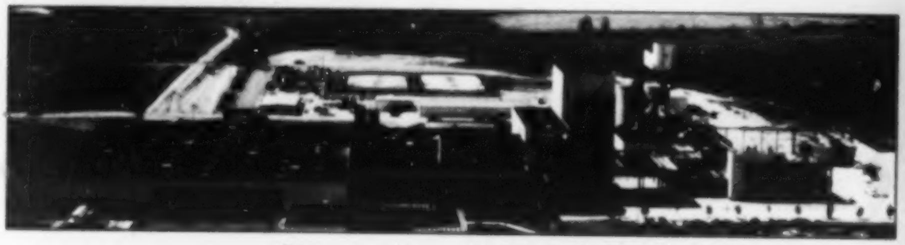
NEW FOOD PLANTS



Universal Foods Inc. will have a food drying facility built in Juneau, WI (right). (Source: Building Construction, Inc.) Newly Weds Foods' new $9 million, highly automated batters and breadings plant (far right) towers above the landscape in Springdale, AR. (Source: Newly Weds Foods, Inc.)

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employees	Architects/ Engineers	Status & Date
American National Corp.	Ackley, IA	Canned corn	Exp.	–	–	55	–	Plng.
AmeriQual Foods	Evansville, IN	Food proc.	New	50	5.5	100	–	Comp.
Anheuser-Busch Co.	Ft. Collins, CO	Beer	New	780	300	550	MK-Ferguson	Stup. 3/89
Anheuser-Busch Co.	Cartersville, GA	Beer	New	860	250	500	MK-Ferguson	Const. 9/91
Anheuser-Busch Co.	Tampa, FL	Beer	Exp.	47	45	49	Lockwood Greene MK-Ferguson	Stup. '90
Anheuser-Busch Co.	St. Louis, MO	Beer	Exp.	–	259	–	MK-Ferguson	Const.
Anheuser-Busch Co.	Newark, NJ	Beer	Exp.	–	–	–	MK-Ferguson	Comp. '91
Anheuser-Busch Co.	Carrollton, TX	Refrigerated bakery dough	Exp.	27	–	–	Webber/ Smith Assoc.	Stup. 11/89
Archer Daniels Midland	Decatur, IL	Biochemicals	New	–	150	–	–	1990
Armour Foods	Louisville, KY	Meat packing	Exp.	–	5	100	–	Comp.
Armour Foods	Springfield, KY	Butter & cheese	Exp.	–	1	5	–	Comp.
ASK Foods	Palmyra, PA	Salads & frozen soups	New	–	2.2	60	Webber/ Smith Assoc.	Const. 11/89
ASK Foods	Palmyra, PA	Frozen foods	Exp.	28	2.2	50	–	Plng.
Associated Milk Prod.	Stephenville, TX	Cheese	New	90	20	90	Webber/ Smith Assoc.	Stup. 3/89
Atlanta Dairy	Atlanta, GA	Dairy	Exp./Renov.	–	–	–	Hixson	Stup. '90
Atlantic Food Services	Manassas, VA	Food dist.	Exp.	31	–	–	St. Onge, Ruff	Stup. 12/90
ATP	Albertville, AL	Mold inhibitors	New	18	1.5	37	–	Comp.
Azteca Milling Co.	Plainview, TX	Corn flour	New	–	14	150	–	Plng.
B								
Bahlsen	Cary, NC	Cookies & crackers	Exp.	358	45	250	–	Comp.
Baltimore Quality Assurance	Baltimore, MD	Spice proc.	New	163	3.7	–	–	Comp.
BCM Food Processing	Muskogee, OK	Boneless chicken	New	7	–	68	–	Const.
Beef Nebraska	Omaha, NE	Meat proc.	Exp.	–	3	50	–	Const.
Bellingham Baking Co.	Bellingham, WA	Bakery prod.	New	22	2	12	–	Plng.
Berry Veal Products	Luzerne, PA	Veal prod.	New	10	1.5	50	–	Plng.
Best Foods	Asheboro, NC	Soup/sauces	New	141	–	130	Fluor Daniel	Stup. 10/88
Biggers Bros.	Alcoa, TN	Distribution ctr.	New	190	12	250	Food Plant Engineering	Stup. 12/88
Big Bear	Columbus, OH	Produce	Renov.	80	–	–	Hixson	Stup. '89
Big Bear	Wapakoneta, OH	Grocery dist.	New	500	–	–	Hixson	Stup. '90
Blue Bell Creameries	Broken Arrow, OK	Ice cream	New	146	–	50	–	Comp.
Blue Bell Creameries	Brenham, TX	Ice cream	Exp.	30	6	–	Descorp/FDI	Comp. 6/89
Blue Ribbon Poultry	Birdsboro, PA	Poultry prod.	Exp.	49	1.1	31	–	Plng.

NEW FOOD PLANTS



A plant expansion has been brewing at Folger's Coffee in Sherman, TX. (Source: Fru-Con Engineering.)

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employ-ees	Architects/ Engineers	Status & Date
Coca-Cola Co.	Greenfield, MA	Soft drinks	New	85	2	70	FL Roberts	Plng.
Coca-Cola Co.	Bangor, ME	Soft drinks	Exp.	42	1	5	–	Comp.
Coca-Cola Co.	Findlay, OH	Soft drinks	New	22	–	5	–	Plng.
Coca-Cola Co.	Ft. Worth, TX	Soft drinks	Exp.	51	–	16	–	Comp.
Coca-Cola Co.	Richmond, VA	Soft drinks	New	300	18	75	–	Plng.
Coed Madalch	Paw Paw, WV	Shiitake mushrooms	New	–	–	75	–	Comp.
Coldwater Seafood	Everett, MA	Frozen fish	Renov.	23	–	–	Webber/ Smith Assoc.	Stup. 3/89
Columbia Yeast	Headland, AL	Bakers yeast	New	20	4.5	25	–	Const.
Columbia Yeast	Bainbridge, FL	Bakers yeast	New	0	4.5	25	–	Const.
ConAgra	Athens, AL	Poultry proc.	Exp.	10	2	200	–	Const.
ConAgra	Fergus Falls, MN	Oat mill	Exp.	–	–	–	–	–
ConAgra	Omaha, NE	Food prod.	New	–	50	430	–	Plng.
ConAgra	Omaha, NE	Food prod.	New	–	12.7	30	–	Const.
ConAgra	S. Sioux City, NE	Oat prod.	New	–	22	30	Younglove	Stup.7/89
ConAgra	Buffalo, NY	Oat mill	Exp.	–	–	–	–	–
ConAgra Fresh Meats	Amarillo, TX	Beef proc.	New	75	65	250	–	Plng. 7/89
Continental Baking Co.	Memphis, TN	Cakes & breads	Exp.	53	–	–	–	Const.
Corn and Beef Ind.	Lexington, NE	Beef proc.	New	–	3.3	85	–	Const.
Countrymark	Lima, OH	Animal feed	New	–	3	25	–	Const.
CPC International	Argo, IL	Dextrose prod.	Exp.	–	–	–	–	Comp. 6/90
Crescent Packaging	Hicksville, NY	Prep. meats	Exp.	10	1.1	40	–	Comp.
Criders of IL	Hutsonville, IL	Chicken	New	–	3.1	301	–	Comp.
Crosfield Chemicals	Joliet, IL	Silica hydrogel	New	4	–	–	–	Comp. 5/89
Crystal Cube Ice Co.	Springfield, MO	Ice	New	–	1.1	15	–	Const.
Crystal Foods	Gaylord, MN	Microwaveable food	Exp.	12	12	175	–	Const.
Crystal Foods	Gaylord, MN	Microwaveable food	New	–	2	–	–	Const.
Cullum Companies	Garland, TX	Distribution ctr.	Renov.	585	–	150	Food Plant Engineering	Stup. 9/88
			D					
Dairymen's Creamery Co-op	Boise, ID	Ice cream	Exp.	20	–	–	Mead & Hunt Consul. Engrs.	Stup. '89
Darling-Delaware	Omaha, NE	Pet food	New	–	3	36	–	Const.
Dawn Food Products	Crown Point, IN	Bakery prod.	New	54	–	140	–	Comp. 1/90
Dehydration Specialists	Umatilla, OR	Onion dehydration	New	21	.20	45	–	Plng. 8/90
Delicious Foods	Grand Island, NE	Onions & mushrooms	Exp.	–	27	190	–	Const.
Del Monte Tropical Fruit Co.	Savannah, GA	Tropical fruit	Renov.	60	–	–	St. Onge, Ruff	Stup. 6/90
Del Monte Tropical Fruit Co.	Port Manatee, FL	Tropical fruit	New	60	–	–	St. Onge, Ruff	Stup. 10/89
Del Monte Tropical Fruit Co.	Camden, NJ	Tropical fruit	Renov.	70	–	–	St. Onge, Ruff	Stup. 10/89

NEW FOOD PLANTS

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employees	Architects/ Engineers	Status & Date
Dean Foods Co.	Sheboygan, WI	Milk	Exp./Renov.	20	–	–	Hertel, Johnson, Eipper & Stopa	Stup. '89
Dennis Logan	Boardman, OR	French fries	New	–	14	140	–	Plng. 7/90
Dept. of the Army	Annville, PA	Food distr.	New	50	–	25	St. Onge, Ruff	–
Desert Valley Date	Coachella, CA	Date proc.	New	26	1.2	–	–	Const.
Dial Meat Purveyors	Dade Cty., FL	Poultry proc.	Exp.	–	1.5	50	–	Const.
Domino Pizza	Ontario, CA	Dough production	Exp.	15	3	10	A. Epstein & Sons, Inc.	Stup. 6/89
Domsea Farms	Pocatello, ID	Fish prod.	New	30	2	100	–	–
Doneli Foods	Dodge, NE	Cheese proc.	New	–	3	30	–	Const.
Double J Bakery	Marysville, PA	Baked goods	New	57	3.3	20	–	Plng.

E

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employees	Architects/ Engineers	Status & Date
Ermark	Harrisburg, PA	Candy	Exp.	–	10	100	–	Const.

F

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employees	Architects/ Engineers	Status & Date
Fairest Foods	Baldwin, WI	Food proc.	New	40	–	–	–	Const. 5/89
Fairfield Farms	Hanover, MD	Frozen foods	New	90	–	–	Webber/Smith Assoc.	Stup. '90
Farr Better Feeds	Clovis, NM	Livestock feeds	New	40	1	36	–	Comp.
Field Packaging	Louisville, KY	Meats	Exp.	–	1.5	–	–	Comp.
Fiesta Trop. Ice Cream	Middletown, NY	Ice cream & frozen prod.	New	15	2	25	–	Plng.
First National Supermarkets	Maple Heights, OH	Produce dist.	Exp.	93	–	–	Webber/Smith Assoc.	Stup. 3/90
Fleischmann's Yeast	Memphis, TN	Yeast	New	50	20	35	–	Plng.
Flourex Flavors	Lakeland, FL	Citrus flavors	Exp.	40	–	22	–	Comp.
Folexco, Inc.	S. Plainfield, NJ	Flavor extracts	New	13	–	–	–	Comp. 12/88
Folgers Coffee	Sherman, TX	Coffee	Exp.	–	–	260	Fru-Con Engineering	1989
Foodways National	Massillon, OH	Frozen foods	Exp.	–	3	50	–	Const.
Fremont Beef Co.	Fremont, NE	Meat Proc.	New	–	10	100	–	Const.
FreshNes Foods Corp.	Solon, OH	Refrig. entrees	Exp.	25	12	30	Lockwood Greene	Stup. '88
Frito Lay	Cucamonga, CA	Salted snacks	Line addit.	–	–	–	Hixson	Stup. '89
Frito Lay	Modesto, CA	Chips & snacks	New	200	20	250	–	Plng. '90
Frito Lay	Frankfurt, IN	Salted snacks	Line addit.	–	–	–	Hixson	Stup. '89
Frito Lay	Louisville, KY	Salted snacks	Line addit.	–	–	–	Hixson	Stup. '89

G

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employees	Architects/ Engineers	Status & Date
General Foods	Jonesboro, AR	Cereals	Exp.	160	–	60	–	Plng.
General Foods	Tulare, CA	Foods	New	32	–	–	–	Plng.
General Foods	Dover, DE	*Stove Top* stuffing	Exp.	30	–	–	A. Epstein & Sons, Inc.	Const.
General Foods USA	Jonesboro, AR	*Post* cereal	New	250	58	30	–	Const.
General Mills	Covington, GA	Breakfast cereals	New	200	100	110	Lockwood Greene	Stup. '89
Gertrude Hawk Candies	Throop, PA	Chocolate candy	New	75	–	50	–	Const.
Giant Food Stores, Inc.	Landover, MD	Produce dist.	Renov.	6	–	–	Webber/Smith Assoc.	1990

NEW FOOD PLANTS

More Park's Sausage will be produced at a new $13 million plant in Baltimore, MD. It is one of three new pork processing plants reported in the survey. (Source: The Facility Group.)

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employees	Architects/ Engineers	Status & Date
Gillette Dairy	Norfolk, NE	Dairy prod.	Exp.	–	3	30	–	Const.
Gilliam Candy Co.	Paducah, KY	Hard candy	Exp.	–	6	30	–	Plng.
Gilster Marylee Corp.	Perryville, MO	Cereal proc.	Exp.	25	2	50	–	Const.
Glenmore Distilleries Co.	Owensboro, KY	Liquor	Exp.	–	3	70	–	Const.
Godchaux Henderson	Reserve, LA	Corn syrup	New	–	55	1,000	–	Plng.
Gold Kist	Crossville, AL	Chicken hatchery	New	30	2.1	42	–	Const. '89
Gold Star Dairy	Clovis, NM	Milk proc.	New	47	5.5	65	–	Comp.
Golden Poultry	Russellville, AL	Poultry	New	–	–	700	–	Const.
Golden Valley Microwave	Mattoon, IL	Popcorn	New	–	10	200	–	Const. '89
Golden West Foods	Bossier City, LA	Frozen food proc.	Exp.	100	5	400	–	Const.
Great Lakes Packing Co.	Bellevue, OH	Meat packaging	New	30	1.8	–	–	Plng.
Great Plains Produce	Eakley, OK	Vegetable proc.	New	–	–	80	–	Comp.
Grtr. Omaha Packaging	Omaha, NE	Meat proc.	Exp.	–	3	35	–	Const.
Green Spring Dairy	Baltimore, MD	Dairy	Exp./Renov.	113	–	170	JAI Engineers	Stup. 11/88
Greenwood Packing	Greenwood, SC	Pork prod.	Exp.	32	–	–	The Stellar Group	Comp. 12/88
Griffin Pie	London, KY	Bakery prod.	Exp.	–	2	40	–	Comp.
Guthrie Sausage	Florence, AL	Proc. meats	New	20	–	10	–	Const.
Gwaltney	Portsmouth, VA	Meat prod.	Exp.	–	.07	80	–	Comp.
H								
Hannaford Bros. Co.	Schodak, NY	Grocery dist.	New	430	–	150	St. Onge, Ruff	Stup. 5/90
Heartland Food Prdts.	Lenox, IA	Foods	New	–	7	100	–	Plng.
Heartland Quality Foods	N. Sioux City, SD	Pet food	New	70	–	66	–	Const. 10/89
H.J. Heinz Company	Tracy, CA	Tomato paste	Exp.	–	10	40	–	Const. 6/89
Heinz Pet Products	Terminal Island, CA	Pet foods	Exp.	50	15	350	Lockwood Greene	Stup. 11/89
Heinz Pet Products	Bloomsburg, PA	Pet foods	Exp.	35	7.5	450	Lockwood Greene	Stup. '90
Heller Seasonings & Ing.	Bethlehem, PA	Spice proc.	New	34	–	–	–	Comp.
Hercules	Vero Beach, FL	Pectin	Exp.	50	2	–	–	Plng.
Hershey Chocolate USA	Derry Twp., PA	Chocolate	New	130	100	60	Sverdrup	Comp. '91
Hershey Foods Corp.	Derry Twp., PA	Chocolate	New	–	39	–	–	Plng. '91
Hershey Foods Corp.	Derry Twp., PA	Chocolate	New	255	–	–	Ballanger Co.	Plng. '91
Hershey Pasta Group	Omaha, NE	Pasta prod.	Exp.	–	20	–	–	Const.
Hill's Pet Products	Richmond, IN	Pet food proc.	New	204	66	250	A. Epstein & Sons, Inc.	Stup. 7/89
Hilmar Cheese	Hilmar, CA	Cheese	Exp.	27	†	–	Mead & Hunt Consul. Engrs.	Stup. '90
Hiram Walker & Sons	Ft. Smith, AR	Liqueurs	Exp.	–	2	30	–	Const.
Hogue Cellars	Prosser, WA	Wines	New	–	1.3	–	Knipper Dunn Franklin	Comp.
Holland Daily Fresh	Mt. Carmel, PA	Tomatoes	New	–	16	150	–	Const. 8/89

NEW FOOD PLANTS

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employees	Architects/ Engineers	Status & Date
Honey Hill Farms	Sacramento, CA	Frozen yogurt	Exp.	8	3	–	Descorp/FDI	Comp. 3/89
H.P. Hood Products	Syracuse, NY	Cultured prod.	Exp./Renov.	–	–	–	Hixson	Stup. '90
Geo. A. Hormel & Co.	Austin, MN	Food packaging	Exp.	40	–	–	–	Plng. 12/89
Hudson Foods	Hope, AR	Chicken proc.	Exp.	–	–	150	–	Const. '89
Hudson Foods	Springfield, MO	Prep. turkey prod.	Exp.	85	4.5	200	–	Const. '89

I

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employees	Architects/ Engineers	Status & Date
Indian River Foods	Ft. Pierce, FL	Citrus juices	Exp.	300	15	30	–	Plng.
Ingomar Packing Plant	Volta, CA	Tomato proc.	New	–	20	–	–	Plng.
Innovative Pork Concepts	Delphi, IN	Pork prod.	New	300	–	250	–	Comp. '90
Iowa Beef Processors	Dakota City, NE	Meat proc.	Exp.	–	10	100	–	Const.
Iowa Beef Processors	Lexington, NE	Beef slaughter/proc.	New	–	77	1,200	–	Plng.
Iowa Beef Processors	Madison, NE	Meat proc.	Exp.	–	20	150	–	Const.
Iowa Ham Processors	Delwein, IA	Ham proc.	Exp.	29	1	50	–	Plng.

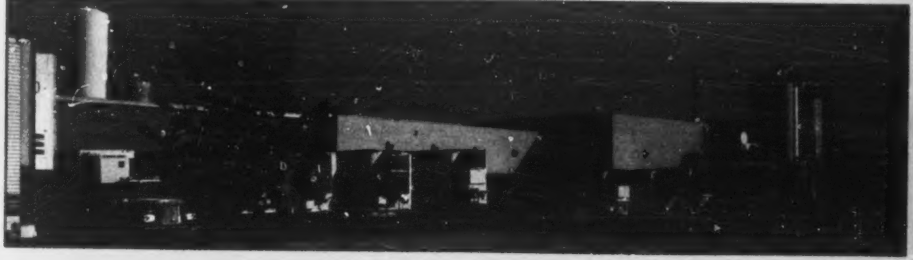
J

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employees	Architects/ Engineers	Status & Date
James Skinner Co.	Omaha, NE	Baked goods	Exp.	–	4.6	87	–	Const.
Jerome Foods	Faribault, MN	Turkey	Exp.	30	4.3	–	–	Plng.
Jim Beam Brands Co.	Clermont, KY	Distilled spirits	Exp.	–	1.3	–	–	Comp.
Johnsonville Foods	Marshalltown, IA	Hog slaughter/proc.	New	50	2.5	50	–	Plng.
Jolly Rancher	Wheat Ridge, CO	Candy	Exp.	–	7	–	–	Plng.
Jordan's Meat	Portland, ME	Processed meats	Exp.	20	2.2	10	–	Comp.

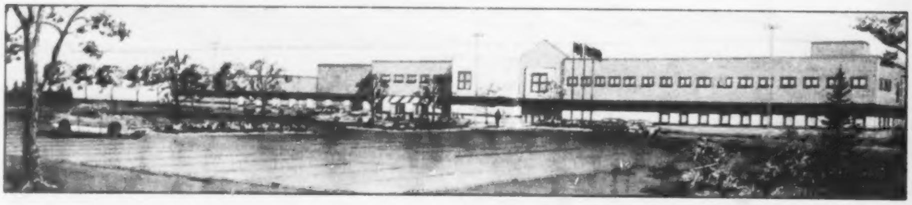
K

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employees	Architects/ Engineers	Status & Date
Kagome	Los Banos, CA	Catsup & juices	New	90	17	40	–	Const.
Keebler Company	Denver, CO	Distribution	Exp.	45	6	–	A. Epstein & Sons, Inc.	Stup. 7/89
Keebler Company	Alsip, IL	Distribution	Exp.	43	2.5	10	A. Epstein & Sons, Inc.	Stup. 5/89
Keebler Company	Oakfield, NY	Cookies	New	39	1.8	3	–	Const.
Kellogg Company	Battle Creek, MI	Cereals	New	–	–	–	Fluor Daniel	–
Kellogg Company	Omaha, NE	Cereals	New	–	20	–	–	Comp.
Kellogg Company	Memphis, TN	Cereals	New	–	1.2 (bil.)	1,000	–	Stup. '91
Keystone Foods Corp.	Gadsden, AL	*McDonald's* food	New	64	9.8	100	Michael J. Lynn	Comp.
Kidd & Company	Henderson, NV	Marshmallows	New	120	–	100	–	Const. 4/89
Kitchens of the Ocean	Riviera Beach, FL	Fish proc.	New	20	–	–	–	Plng.
Kraft	Tampa, FL	Food prod.	New	133	10	193	–	Const.
Kraft	North Lawrence, NY	Cultured prod	Exp./Renov.	85	–	–	Hixson	Stup. '89/'90
Kraft Foodservice Group	Garland, TX	Food serv. dist.	Exp.	206	–	–	–	Const.
Kroger	Cincinnati, OH	Frozen baked goods	Renov.	26	–	–	Hixson	Stup. '88
KW, Inc.	Londonderry, NH	Coca Cola bottler	New	170	5	–	–	Plng.

Dean Foods will expand its Sheboygan, WI milk plant by 20,000 square feet. (Source: Hertel, Johnson, Eipper & Stops.)



NEW FOOD PLANTS



A new 230,000 sq. ft. distribution center for Progressive Distributors Inc. was started up in Winthrop, ME. (Source: St. Onge, Ruff & Associates, Inc.)

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employees	Architects/ Engineers	Status & Date
L								
La Fronteriza	Toledo, OH	Tortilla chips	New	–	1	33	–	Const.
LaLoma Foods	San Bernadino, CA	Food prod.	Renov.	65	8	60	Davy McKee	Stup. '90
Leaf	Wheat Ridge, CO	Candy	Exp.	10	10	75	–	Const.
Leprino Foods	Allendale, MI	Mozzarella cheese	New	200	–	–	Mead & Hunt Consul. Engrs.	Stup. '89
Lindt & Sprungli Co.	Stratham, NH	Candy	New	100	–	100	–	Const. '89
Long Beverage	Morrisville, NC	Beverages	New	40	1.1	–	–	Comp.
Longmont Foods	Longmont, CO	Food proc.	New	–	4.2	50		Const.
Louis Dreyfus	New Madrid, MO	Rice	New	–	4.8	50	–	Plng.
Louis Rich & Co.	Dresden, MO	Turkey proc.	New	–	50	700	–	Const.
Louis Rich & Co.	Sedalia, MO	Sandwich meats	New	–	50	700	–	Const.
Louis Rich & Co.	Sedalia, MO	Turkey/food	New	–	100	1,000	–	Const.
Louisville EOP	Louisville, KY	Vegetable oil	Exp.	–	–	70	–	Plng.
Lynks Seeds	Marshalltown, IA	Seed proc.	Exp.	–	7	5	–	Plng.
M								
Mama D'Angelo	Salt Lake City, UT	Pizza	New	–	–	–	–	Const.
Martha White Foods	Jackson, TN	Flour & cornmeal	Exp.	147	2	–	–	Plng.
William E. Martin & Sons	Jamaica, NY	Spice proc.	New	50	–	–	–	Comp.
Maruchan Virginia Inc.	Chesterfield Cty., VA	Oriental noodles	New	160	10	40	Kajima Int'l	Plng. '90
Mazza Cheese Co.	Sumner, WA	Cheese	New	70	–	–	Niro Atomizer/ Shambaugh & Sons	–
McIlhenny Co.	New Iberia, LA	Tabasco sauce	Exp.	–	–	60	–	Const.
McKee Baking Co.	Stuarts Draft, VA	Snack cakes	New	–	–	500	Fluor Daniel	Stup. 1/90
Meat Producers Assn.	Okeechobee Cty, FL	Meat packing	New	15	2	80	–	Const.
Meijer, Inc.	Grand Rapids, MI	Distribution ctr.	New	800	–	250	Food Plant Engineering	Stup. 7/89
Meijer, Inc.	Lansing, MI	Produce dist.	Renov.	40	–	–	Webber/Smith Assoc., Inc.	1989
Merchandise Warehouse Co.	Indianapolis, IN	Frozen food storage	New	118	–	–	Webber/Smith Assoc., Inc.	Stup. 2/90
Merchants Refrigeration	Chester, NY	Frozen food dist.	New	90	5	40	–	Const.
Mesa Food Products	Louisville, KY	Tortillas	Exp.	–	1.2	20	–	Const. 12/89
Metz Baking	Omaha, NE	Bakery goods	Exp.	–	17	100	–	Const.
Midlantic Distribution	Dayton, NJ	Food dist.	New	211	–	–	–	Comp.
Milkco	Asheville, NC	Milk prod. & juices	Exp.	12	1.5	–	–	Comp.
Millard Refrigeration	Omaha, NE	Meat proc.	Exp.	–	3	30	–	Const.
Miller Brands	Denver, CO	Beer	New	150	3.3	–	–	Plng.
Miller Brewing Co.	Milwaukee, WI	Beer	Exp.	–	26	–	–	Comp.
Milton G. Waldbaum Co.	Wakefield, NE	Eggs	Exp.	–	17	106	–	Const.
Minn-Dak Yeast Co.	Wahpeton, ND	Yeast	New	–	10	–	–	Const. '90
L.J. Minor Corp.	Celina, OH	Food proc.	Exp.	–	–	75	–	Plng.

NEW FOOD PLANTS

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employees	Architects/ Engineers	Status & Date
Monfort Packing	Dumas, TX	Protein gelatin	Exp.	–	4	–	–	Plng.
Monfort Pork	St. Joseph, MO	Hog by-products	Exp.	–	10	135	–	Const.
Mt. Olive Pickle Co.	Mt. Olive, NC	Pickles & relishes	Exp.	52	1	–	–	Const.
Mrs. Smith's Frozen Foods	Rossville, TN	Frozen waffles	Exp.	80	–	–	Webber/Smith Assoc., inc.	Stup. 1/90
			N					
Nabisco	Naperville, IL	Cereals	Exp.	–	30	–	Sverdrup	Stup. 8/89
National Oats Co.	Cedar Rapids, IA	Cereals	Exp.	–	12	–	–	–
National Starch	–	Starch	Exp.	–	3	–	C.W. Nofsinger	–
Nebraska DUPACO	Omaha, NE	Meat proc.	Exp.	–	12.5	130	–	Const.
Nehi-Royal Crown	Bowling Green, KY	Soft drinks	Exp.	–	2.5	51	–	Plng.
Nestle Enterprises	St. Joseph, MO	Pet foods	Exp.	–	–	200	–	Const.
Nestle Foods Corp.	Milledgeville, GA	Chocolate	Renov.	348	–	–	Webber/Smith Assoc., Inc.	Stup. '90
Nestle Foods Corp.	Granite City, IL	Food prep.	Exp.	–	1.3	–	–	Const.
Newly Weds Foods	Springdale, AR	Breading prod.	–	–	9	–	–	–
Niagara Candy & Ice Cream	Cheektowaga, NY	Candy & ice cream	Exp.	58	2.4	36	–	Const.
NORPAC Foods, Inc.	Hermiston, OR	Food proc.	New	90	9	240	–	Const. 4/90
N. Star Foods	W. Union, IA	Turkey proc.	New	–	1.1	80	–	Plng.
Nottawa Gardens W.	Cordell, OK	Poultry proc.	New	–	–	240	–	Const.
NutraSweet	Manteno, IL	Artificial sweetener	New	70	12	120	Sverdrup	Stup. 6/90
NutraSweet	Augusta, GA	NutraSweet mfr.	New	–	–	–	–	1991
			O					
Oakhurst Dairy	Portland, ME	Milk	Exp.	6	4	–	Descorp/FDI	Comp. 7/89
Ocean Spray Cranberries	Vero Beach, FL	Citrus juices	Exp.	100	15	–	–	Const.
Ocean Spray Cranberries	Sulphur Springs, TX	Cranberry juice	Exp.	70	1	–	–	Const. 8/89
Ocean Spray Cranberries	Tomah, WI	Freezer dist.	New	121	–	–	The Stellar Group	Comp. 9/89
Odom Sausage	Nashville, TN	Sandwiches	New	50	2	45	–	Plng.
Old Europe Cheese	Benton Harbor, MI	Cheese	New	–	1.7	30	–	Comp.
Old Watchitoches Meat	Logansport, LA	Meat pies	New	40	–	200	–	Comp.
Omaha Steaks Int'l	Omaha, NE	Packaged meats	Exp.	–	17.5	179	–	Const.
			P					
Palmetto Baking Co.	Orangeburg, SC	Bakery prod.	Exp.	20	.20	–	–	Comp.
Pandelus Seafood	Sanford, FL	Shrimp proc.	New	–	–	100	–	Const.
Panhandle Catfish	Blountstown, FL	Proc. plant	Exp.	12	.40	108	–	Plng.
Park Foods	Canton, OH	Chicken	Exp.	–	13.7	–	–	Plng.
Parks Sausages Co.	Baltimore, MD	Pork prod.	New	133	13	200	Facility Eng.	Stup. 1/90
Pegler Sysco Food Svc.	Lincoln, NE	Whsl. food	Exp.	–	4	167	–	Const.
Pepperidge Farm	Adamstown, PA	Bakery prod.	New	600	180	800	Day & Zimmerman	Stup. 1991
Pepsi-Cola Co.	Riverside, CA	Soft drinks	New	–	26	–	–	Plng.
Pepsi-Cola Bottling Co.	Columbus, OH	Soft drinks	Exp	54	–	–	–	Plng.
Pepsi-Cola Co.	Riverside, CA	Soft drinks	New	200	26	300	H.F. Thompson	Plng.
Pheasant Concepts	Sedalia, MO	Pheasant proc.	New	28	3.5	100	–	Plng.

NEW FOOD PLANTS

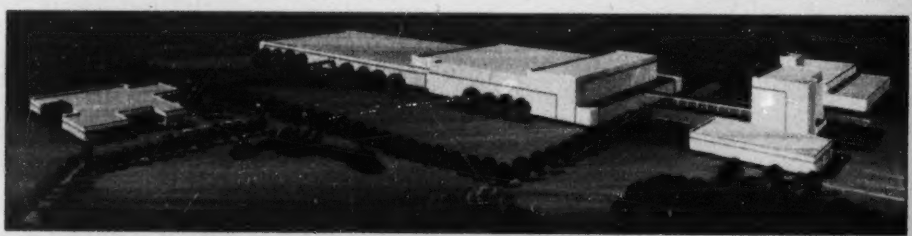
Construction will begin in January on a new Rocco Turkey's processing plant in St. Pauls, NC. (Source: Shillington & Associates.)

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employees	Architects/ Engineers	Status & Date
Piknik Products	Montgomery, AL	Condiments	Exp.	27	–	20	–	Const. 3/89
Pilgrim's Pride	DeQueen, AR	Chicken proc.	Exp.	–	1.5	50	–	Const.
Plains Co-op Oil Mill	Lubbock, TX	Crushed cottonseed	Exp.	7	4	–	–	Const.
Planters-Life Savers Co.	Holland, MI	Confections	Renov.	15	2	30	Lockwood Greene	Stup. 3/89
Planters-Life Savers Co.	Holland, MI	Confections warehouse	Exp.	26	0.75	–	Lockwood Greene	Stup. 12/88
Planters-Life Savers Co.	Winston-Salem, NC	Candy, gum & peanuts	New	–	–	50	–	Comp.
Planters-Life Savers Co.	Suffolk, VA	Nuts & candy	Exp.	450	138	–	–	Const.
Plumrose	Booneville, MS	Meat prod.	Exp.	–	3.1	150	–	Comp.
Prairie Farms Dairy	Peoria, IL	Dairy prod.	Exp.	9	1	–	–	Plng.
Progessive Distributors	Winthrop, ME	Distribution ctr.	New	230	–	200	St. Onge, Ruff	Stup. 10/89
Publix Super Markets	Lakeland, FL	Bakery	Exp.	100	–	–	–	Const.
PYA Monarch	Apopka, FL	Foodservice dist.	Exp.	2.2	–	–	Setter, Leach & Lindstrom	Comp. 7/88
Q								
Quaker Oats	Kankakee, IL	Cereal	Exp.	–	10	50	–	Const.
Quaker Oats	Mountaintop, PA	Gatorade	Exp.	150	–	40	–	Plng. '90
Quaker Oats	Dallas, TX	Gatorade	Exp.	200	–	80	–	Comp.
Quick Candy Co.	Marion, KY	Candy	New	–	2.8	200	–	Comp.
Quik 'N Tastee Quick Trip	Belton, MO	Proc. food	New	–	8	208	–	Comp.
R								
Richland Foods	London, KY	Cookies	New	128	8	450	–	Const. 2/90
Richland Turkeys	Olney, IL	Turkeys	New	–	1	94	–	Const.
RJR Nabisco	Garner, NC	Baked snacks	New	1,100	400	650	Bechtel Nat'l	Plng.
Rocco Turkeys	St. Pauls, NC	Turkey proc.	New	147	–	–	Shillington & Associates	Stup.1/90
Rogers Brothers	Nampa, ID	Vegetables	New	33	2	28	–	Const. '90
B C Rogers Feed Mill	Morton, MS	Proc. poultry	Exp.	–	.50	100	–	Comp.
B C Rogers Processors	Forest, MS	Proc. poultry	Exp.	–	1.5	40	–	Comp.
Rotella's Italian	Omaha, NE	Bakery prod.	Exp.	–	5.5	30	–	Const.
Roxford Foods	Fresno, CA	Turkey proc.	New	146	–	200	–	Comp.
Russell Stover Candies	Wildwood, FL	Candy dist.	New	45	.70	30	–	Plng.
Rutter Dairy	York, PA	Milk	Exp.	5	3	–	Descorp/FDI	Stup. 11/89
S								
Saddle Creek Corp.	Lakeland, FL	Food warehouse	Exp.	200	–	–	–	Plng.
Sara Lee	Winston-Salem, NC	Food dist.	New	600	22	300	–	Const.

NEW FOOD PLANTS

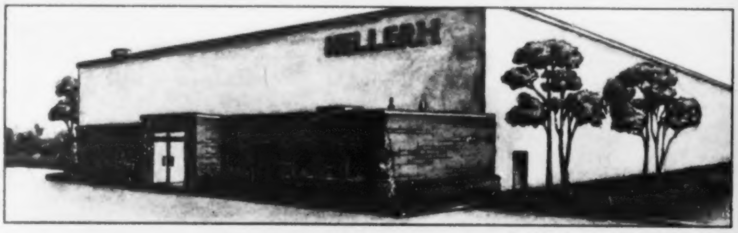
Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employ-ees	Architects/ Engineers	Status & Date
Schenley Distillers	Louisville, KY	Distilled spirits	Exp.	–	3.2	75	–	Comp. 2/89
Scrivner, Inc.	Peoria, IL	Frozen food dist.	Exp.	28	–	–	Webber/Smith Assoc., Inc.	Stup. '90
Seaboard Farms	Athens, GA	Chicken proc.	Exp.	110	16	–	–	Comp. 4/89
Seaboard Farms	Mayfield, KY	Poultry feed	New	–	–	–	Younglove	Comp. 9/90
Select Cheese Co.	Turlock, CA	Cheese	New	22	2	30	–	Plng.
Seneca Corp.	Othello, WA	Juice proc.	New	28	4	35	Food Plant Engineering	Stup. 9/88
Shade Foods	Kansas City, KS	Chocolate	New	–	8	170	–	Const. 11/89
Shade Pasta	Fremont, NE	No-boil pasta	New	–	12	100	–	Const.
Shade Pasta	Fremont, NE	Food proc.	New	29	–	14	–	Comp.
Shellfish Seafoods	Princess Anne, MD	Clam proc.	New	27	–	100	–	Const. '89
Shenandoh's Pride	Mt. Crawford, VA	Dairy & UHT milk	New	109	–	140	JAI Engineers	Stup. 12/88
Signature Foods	Omaha, NE	Ground beef proc.	Exp.	–	3.1	30	–	Const.
Sims Brothers Seafood	Delcambre, LA	Shrimp	Exp.	–	–	30	–	Plng.
Smith's Dairy Prod.	Orrville, OH	Ice cream	Exp.	15	4	–	Descorp/FDI	Comp. 8/89
Smith Stores	Layton, UT	Ice cream	New	155	–	–	Webber/Smith Assoc., Inc.	Stup. '90
Southern MN Sugar Beet Co-op	Renville, MN	Molasses desugarization	Exp.	–	18	–	–	Plng. '90
Southwestern Premier	Anadarko, OK	Peanut butter	New	–	–	17	–	Plng.
Spicecraft, Inc.	Gerald, MO	Spices	Exp.	22	–	–	–	Comp. 9/89
A.E. Staley Mfg.	–	Dextrose	Exp.	–	10	–	C.W. Nofsinger	–
Stokely USA	DeForest, WI	Veg. proc./canner	New	260	3	–	–	Const.
Sugar Foods Corp.	Lawrenceville, GA	*Sweet 'N Low*	New	86	–	50	–	Plng.
Sun Fresh Foods	Mesa, AZ	Prep. salads	New	37	–	–	–	Const.
Sun-Husker Foods	Lincoln, NE	Meat proc.	Exp.	–	10	100	–	Const.
Superior Cake	Southbridge, MA	Pastries	Exp.	20	–	30	–	Const.
Sweet Thanks Candy	Woods Cross, UT	Candy	Exp.	–	–	100	–	Plng.
Swenson Brothers, Inc.	Eugene, OR	Frozen pizza	New	21	2	50	–	Const.
Swift & Eckrich	Omaha, NE	Meat proc.	Exp.	–	10	100	–	Const.
SYSCO Corp.	Jacksonville, FL	Foodservice dist.	New	115	4.7	–	Setter, Leach & Lindstrom	Comp. 2/89
SYSCO Corp.	Miami, FL	Foodservice dist.	New	95	4.8	–	Setter, Leach & Lindstrom	Comp. 5/89
SYSCO Corp.	Orlando, FL	Foodservice dist.	Exp.	48	2.1	–	Setter, Leach & Lindstrom	Const.
SYSCO Corp.	Atlanta, GA	Foodservice dist.	Exp.	100	3	–	Setter, Leach & Lindstrom	Comp. 5/89
			T					
Townsend Foods	Hummels Wharf, PA	Poultry	New	–	–	400	–	Plng.
Triple T Foods	Springdale, AR	Dog food	Exp.	–	1	–	–	Const.
Tri-Valley Growers	Gridley, CA	Fruit proc.	Exp.	–	10	–	–	Plng.

General Mills' 350,000 sq. ft. cereal manufacturing facility in Covington, GA will serve as the flagship operation. (Source: Lockwood Greene Engineers.)



NEW FOOD PLANTS

A new spice processing plant has recently been completed in Bethlehem, PA for Heller Seasonings & Ingredients (Source: Heller Seasonings & Ingredients).



Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employees	Architects/ Engineers	Status & Date
Turkey Hill Dairy	Conestoga, PA	Milk & ice cream	Exp.	138	–	135	JAI Engineers	Stup. 1/90
Turner Dairies	Fulton, KY	Milk & ice cream	Exp.	–	1	–	–	Const.
Tyson Foods	Albertville, AL	Poultry	Exp.	–	1	15	–	Comp.
Tyson Foods	Gadsden, AL	Food proc.	Exp.	–	–	350	–	Const.
Tyson Foods	Berryville, AR	Poultry proc.	New	–	11	170	–	Plng.
Tyson Foods	Grannis, AR	Poultry proc.	New	–	21.6	700	–	Plng.
Tyson Foods	Springdale, AR	Food prod.	New	–	–	300	–	Plng.
Tyson Foods	Rogers, AR	Deboning & proc.	New	–	1.5	35	–	Plng.

U

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employees	Architects/ Engineers	Status & Date
Wm. Underwood	Hannibal, MO	Soup	Exp.	35	5	40	–	Const.
Universal Foods Corp.	Juneau, WI	Food drying	–	–	.721	–	–	–
Universal Frzn. Novelty Co.	Omaha, NE	Ice cream	Exp.	–	9.2	120	–	Const.
Utz Quality Foods	St. Charles, MD	Distribution center	New	40	–	–	–	Const.

V

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employees	Architects/ Engineers	Status & Date
Valley Foods	Cumberland Cty., NC	Chicken/turkey proc.	New	13	–	127	–	Plng.
Valley Grain Prdts.	Henderson, KY	Corn flour	New	–	10	50	–	Plng.
Victoria Sweets	Ventura, CA	Cookies	New	35	7.5	50	Davy McKee	Stup. '91
Vlasic Foods	Farmington Hills, MI	Condiments	New	80	–	320	Siegall/ Tuomaala	Const.
Vogel Popcorn	Hamburg, IA	Popcorn	Exp.	–	23	100	–	Plng.

W

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employees	Architects/ Engineers	Status & Date
Wakefern Food Corp.	Elizabeth, NJ	Groc. dist.	New	250	–	300	St. Onge, Ruff	Stup. 10/89
Water Technologies	Knoxville, TN	Bottled water	New	–	–	150	–	Comp.
Wegmans Food Mkts.	Rochester, NY	Frozen food dist.	New	100	50	–	St. Onge, Ruff	Comp. '90
Western Illinois Foods	Monmouth, IL	Foods	New	–	4.4	67	–	Comp.
Winters Candy Co.	Manteno, IL	Candy	Exp.	25	1.5	100	–	Const.
Wisconsin Dairies Co-op	Clayton, WI	Italian cheese	Exp.	2	–	–	Mead & Hunt Consul. Engrs.	Stup. '88
Wisconsin Dairies Co-op	Reedsburg, WI	Butter, milk	Exp.	4	–	–	Mead & Hunt Consul. Engrs.	Stup. '89
Wolfgang Candy	York, PA	Candy	Exp.	29	1.1	85	D.R. Delisle	–
Worthington Foods	Zanesville, OH	Egg substitute prod.	New	135	.700	– –	Lockwood Greene	Stup. 1/90

Z

Company	Plant Location	Primary Product	Type Project	M Sq. Ft.	Est. Cost ($ millions)	Employees	Architects/ Engineers	Status & Date
Zacky Farms	Traver, CA	Poultry feed	New	–	–	–	Younglove	Comp. 11/90
Zephyrhills Bottled Water	Zephyrhills, FL	Bottled water	Exp.	105	5	25	–	Const.

COSTING PROJECTS

JUSTIFYING CAPITAL COSTS TO BETTER COMPETE

Justifying the cost of a capital project means presenting it in terms that management understands: ROI, NPV, IRR, and hurdle rate.

CHARLES E. MORRIS
Midwest Editor

"*Ultimately, wealth must be created by the imaginative and intelligent management of assets, not by devising novel financing and ownership arrangements for those assets.*"–Professor Robert S. Kaplan, Harvard Business School, *Harvard Business Review*, July/Aug. 1984.

With mergers, acquisitions, "restructurings," leveraged buyouts and junk bonds rampant in today's corporate jungle, many executives seem to have forgotten–or ignored–this principle. "It is hard to imagine that a focus on creating wealth through the rearrangement of ownership claims rather than on managing tangible and intangible assets more effectively will help companies survive as world-class competitors," Kaplan also noted.

Effectively managing assets to build long-term value and compete in today's global market includes a well-planned and economically justified capital-spending program.

But how does management determine priorities? And how does the corporate engineer or plant manager justify to corporate management the capital spending needed to upgrade a plant or a production line, especially when he's competing with other projects for limited funds?

Estimating costs, savings

William D. Weaver, food procesing group manager at Rust International (Birmingham, AL) and former group manager of process/mechanical engineering at Ralston Purina Co., listed three types of capital projects at the American Society of Bakery Engineers (ASBE) meeting on March 8 in Chicago:

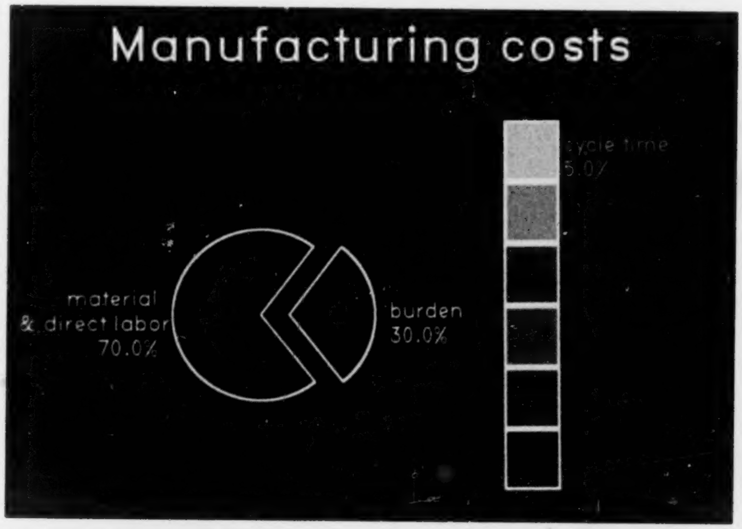
1) *Mandatory projects* which must be carried out to remain in business e.g. to meet air or wastewater regulations.

2) *Business-sustaining projects*, such as replacing worn equipment or projects needed to meet competitive pressures.

3) *Cost-justified projects*, which require an acceptable rate of return on the investment and usually involve an expansion of assets. Examples: projects which increase capacity on an existing product line, or needed to manufacture new products.

Quantifying the advantages of a capital project requires three essential elements, Weaver continued: 1) estimating capital costs; 2) determining benefits; and 3) quantifying returns.

Estimating the capital cost requires some degree of engineering, depending on the accuracy required. The first stage generally requires accuracy within 20 percent, sufficient if the ROI is high (more than 30 percent). But if return is marginal or other projects are competing for funds, engineering to an



All cost savings, direct and indirect, should be considered when justifying the cost of a capital project. When justifying CIM, however, savings are difficult to quantify until after the system is installed and operating. (Source: The Foxboro Co.)

←Circle 48 on Inquiry Card

accuracy of 10 percent may be required. "You should know what management will accept when requesting project approval," Weaver advised.

Benefits to be derived from the project must be determined for an ROI analysis. Earnings and savings can come from many sources, Weaver pointed out. Added capacity, for example, can generate income through added sales and faster production rates. Direct costs should be studied for potential operating savings in labor, ingredients and supplies. Indirect costs such as maintenance, sanitation management and insurance may also be impacted. Possible *increases* in direct and indirect costs should also be studied. The capital cost of support facilities such as laboratories, offices and parking lots is often overlooked.

Quantifying ROI

Once capital cost and the benefits to be derived from it have been determined, return on investment must be calculated.

First step: Understand how management views money, advised Vincent S. Botto, manager of facilities planning for Campbell Taggart, Inc., at the Food Plants/88 conference conducted last fall by Food Plant Strategies, Inc. at Lincolnshire, IL. This means understanding how the value of money changes with time and interest.

Weaver stressed the same theme at the ASBE meeting. "Quantifying the return is necessary to make decisions that maximize the value of the company," he added.

Weaver outlined three methods of quantifying ROI (see sidebar): 1) simple payback; 2) net present value (NPV); and 3) internal rate of return (IRR).

Botto presented similar formulas for calculating both NPV and IRR. "Management will want to maximize the amount of return on a given project, therefore those with the highest IRR will be viewed as most favorable," he added. Botto defined IRR as "the rate at which the money is discounted so that the present value of the project equals the initial investment."

Management's target IRR is known as the *hurdle rate* – the interest the company could earn on low-risk investments, Botto continued. If IRR on a project is only 4 percent, for example, and the company can earn 10 percent by investing the requested capital in a long-term bond, the project would probably be rejected.

Preparing the proposal

In preparing project documents, it's important to know what direction the proposal will take – whether it's going to be for a replacement item to maintain present operations, or for a new piece of equipment to enhance operations, said Botto.

The replacement project: Replacing worn equipment is justified when in management's opinion the product manufactured on a given line is consistent with long-range corporate objectives, and when avoided repair costs offer a satisfactory ROI. Replacement is also justified when old equipment cannot be repaired due to obsolescence of its parts. Information needed:

- age and condition of the existing equipment, including detail on its deterioration and impact on operations.
- maintenance and downtime history.
- technology obsolescence, and why repair should be avoided.
- factors which caused equipment failure, and the impact on operations of equipment failure.

With this information, Botto continued, project documentation can be prepared along the following guidelines:

Current situation, including the description of the equipment, and the amount of sales and profit the existing line contributes to the company.

Proposed actions, describing in detail what you intend to do and what pieces of equipment will be replaced. Associated equipment should be considered. Example: If a packaging machine is going to be replaced, will the infeed and discharge conveyors also need replacement?

Justification, a summary of the additional maintenance costs required by the existing equipment, and expenses that can be avoided with the new equipment. Caution: If maintenance savings are claimed, they must be obtainable. Even new equipment has maintenance costs.

The cost-reduction or operational-enhancement project: These include projects which will result in labor savings, material savings, cripple reduction, utility savings, reduced distribution costs and reduced administrative costs. Key: results must be verifiable. *All* savings should be included. "So many times we look at the direct costs of a project and overlook the indirect and administrative cost savings that will be enjoyed," Botto observed. Project documents are prepared along similar guidelines:

Current situation details the equipment being used and its impact on line operations.

Proposed actions can be very succinct; e.g. reducing labor costs by a given amount.

Justification tells management how the project will impact the company and capital

Methods of quantifying ROI

1. SIMPLE PAYBACK: number of years required to recover the investment. Example: cash flow (after tax, profit, and depreciation) of two mutually exclusive projects each costing $10,000:

Year	Project A	Project B
1	$5,000	$1,000
2	4,000	2,000
3	1,000	3,000
4	1,000	4,000
5	1,000	5,000

Project A offers a three-year payback on its original cost; Project B offers a four-year payback. This would probably result in Project A being selected, but A may not be the best choice because this method ignores cash flow beyond the payback period.

2. DISCOUNTED CASH FLOW: These methods consider the value of money over time; i.e., a dollar received today is worth more than a dollar received in the future. There are two methods of calculation which involve discounted cash flow:

A. NET PRESENT VALUE (NPV): This method determines the present value (PV) of future cash flows and subtracts it from the capital investment (NPV = PV-CI). Capital investment is known, but present value must be determined; to determine present value, future value (FV) must be understood. To determine future value, $FV = PV\ (1 + i)^n$, where "i" is interest rate and "n" the number of years invested. To determine the future value of $1,000 at 10% interest for five years:

$$FV = 1{,}000\ (1 + .10)^5$$
$$FV = 1{,}000\ (1.6105)$$
$$FV = 1{,}610.50$$

To determine the present value of some future amount, the equation is rearranged: $PV = \dfrac{FV}{(1 + i)^n}$. Using the values above:

$$PV = \frac{1{,}610.50}{(1 + .10)^5}$$
$$PV = 1{,}000$$

Example: net present value (NPV) of a $10,000 project:

Year	Cash flow	Interest @ 10%	PV of cash flow
1	5,000	0.91	4,450
2	4,000	0.83	3,320
3	3,000	0.75	2,250
4	1,000	0.68	680
			PV 10,800
			- CI 10,000
			NPV 800

NPV is positive, so the project should be accepted.

B. INTERNAL RATE OF RETURN (IRR). The IRR is the calculated interest rate that makes the present value of the internal cash flows equal to the capital investments: NPV = PV-CI = 0. Another way of saying this is "At what interest rate will NPV be zero?" Since the goal is to find an interest rate that will produce an NPV of zero, a higher interest rate must be chosen. Example, assuming 15%:

Year	Cash flow	If interest 10 %	Present value	If interest 15%	Present value
1	5,000	0.91	4,550	0.87	4,350
2	4,000	0.83	3,320	0.76	3,040
3	3,000	0.75	2,250	0.66	1,980
4	1,000	0.68	680	0.57	570
			PV 10,800		9,940
			- CI 10,000		10,000
			NPV 800		(60)

In the second trial above, NPV is negative 60, which indicates that the IRR is slightly less than 15 percent. If a precise number is required, the two points can be graphed and the precise IRR interpolated from the graph. Or, it can be calculated with computer programs.

Source: William D. Weaver, Rust International.

Criteria for automation expenditures

	High	Medium	Low
Financial payback	90	9	1
Improved quality	80	16	2
Long term benefits	73	25	2
Operator safety, environment	68	27	5
Reduced scrap, rework	64	31	5
Flexibility	62	34	4
Competition	42	47	11
Management information	33	47	20
Public image	1	28	71

Sources: National Electronics Manufacturers Assn. (NEMA); Foxboro Co.

A recent survey by the National Electronic Manufacturers Association shows that managers still consider payback as the primary measure for justifying automation expenditures. Long-term issues, however, were also considered important. (Sources: NEMA, Foxboro)

spending in terms with which they are familiar: NPV, IRR, ROI, and hurdle rate.

Justifying CIM

Computer integrated manufacturing can't be justified unless you know what problem is being solved, says Dr. Malcolm C. Beaverstock, manager of advanced management technology at The Foxboro Co. (Foxboro, MA). "The typical situation I find is a corporate group who wants funds to solve some vague productivity problem at a plant site," he adds. "Investments that try to solve poorly defined problems rarely succeed in gaining approval."

One problem in justifying CIM: Most benefits are determined *after* systems are installed and working, and were either not considered or not included in the justification procedure. According to Beaverstock, engineers reporting on CIM project results cite the following reductions: lead time (30-60 percent); engineering design (15-30 percent); work-in-progress (30-60 percent); personnel costs (5-20 percent); inventory (50-90 percent); floor space (40-70 percent); cost of quality (25-60 percent). Improvements: Engineering-analysis capability increased 300-500 percent, equipment uptime improved 200-300 percent, and quality (yield) improved 200-500 percent.

Another problem: outdated cost accounting systems, which focus on direct costs rather than indirect costs. Today, there are three manufacturing support people for every direct worker—a reversal from the situation in 1915—and labor cost in a typical high-technology company today seldom exceeds 10 percent of total costs, yet cost-accounting systems are still based on the 1915 view of labor.

Cost-accounting systems are slowly changing, however, as the manufacturing community recognizes the inadequacy of the present system. Absorption accounting allocates all costs (even the corporate jet) to each product produced, whereas more modern activity and business cost systems attempt to isolate and allocate costs by use.

Any justification must recognize the type of accounting system used by the company so benefits can be correctly calculated, says Beaverstock. CIM justification methods commonly used today:

- *Look-back*, "probably the most widely used because of the frustration involved with trying to calculate ROI." Look-back starts with funding a small pilot project (usually based on sheer belief in automation), establishes an audit trail, notes the benefits and extrapolates them to another project. Although this method reduces risk, results are delayed and it's possible to create "islands of automation" if individual projects are not integrated.
- *ROI*, which often fails because those preparing the documents make basic errors such as not including the benefits of inventory reduction, space savings or interaction with other operating units. Other problems result from outdated corporate policies such as unrealistic hurdle rates or interest costs, and failure to recognize intangible benefits.

Once discounted cash flow is established, there are usually not enough tangible benefits for a positive NPV, Beaverstock observes. One way of presenting such figures to management is by asking an adjustment figure to make NPV meet corporate standards. Management must then decide if the intangibles establish a reasonable risk. Managers usually agree that the intangibles of a CIM project will balance an adjustment figure of less than $300,000 per year. Economic models based on factors influenced by automation can also be used to predict ROI.

- *Strategic*, which evaluates competitive factors: the market position of a particular plant or product line; product costs vs. competition (looking for the competitive edge); and business impact of the project.

The steps required to justify CIM are nearly identical to those for any engineering or construction project, Beaverstock concludes. "Knowledge of objectives, analysis of present operations and a good definition are the basic requirements," he adds.

CHILTON'S

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FOOD ENGINEERING

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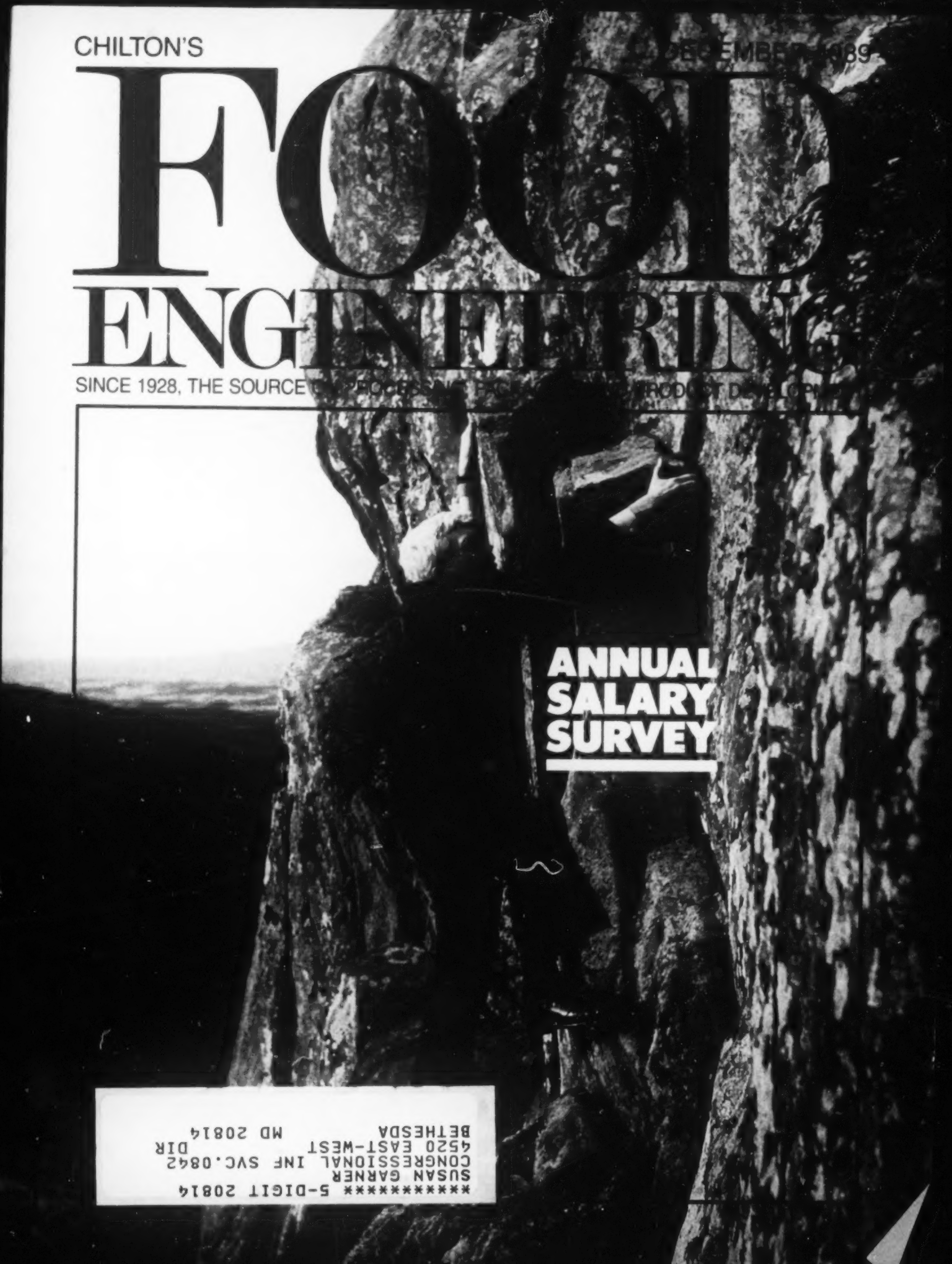

ANNUAL SALARY SURVEY

********** 5-DIGIT 20814
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FOOD ENGINEERING

COVER STORY

Salary increases in the food industry averaged 7.4 percent during the past year. But most people's concerns are not about inadequate salaries, but overwork and lack of job security and benefits.

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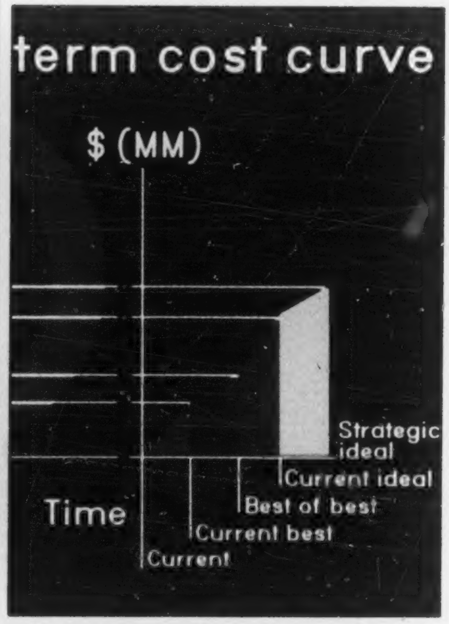

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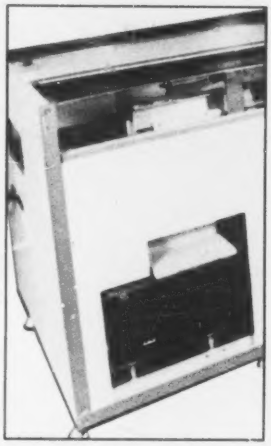

Special Emphasis

CASING, CARTONING, AND PALLETIZING
The current crop of machines works at amazing speeds providing phenomenal efficiency levels for today's packagers and processors.
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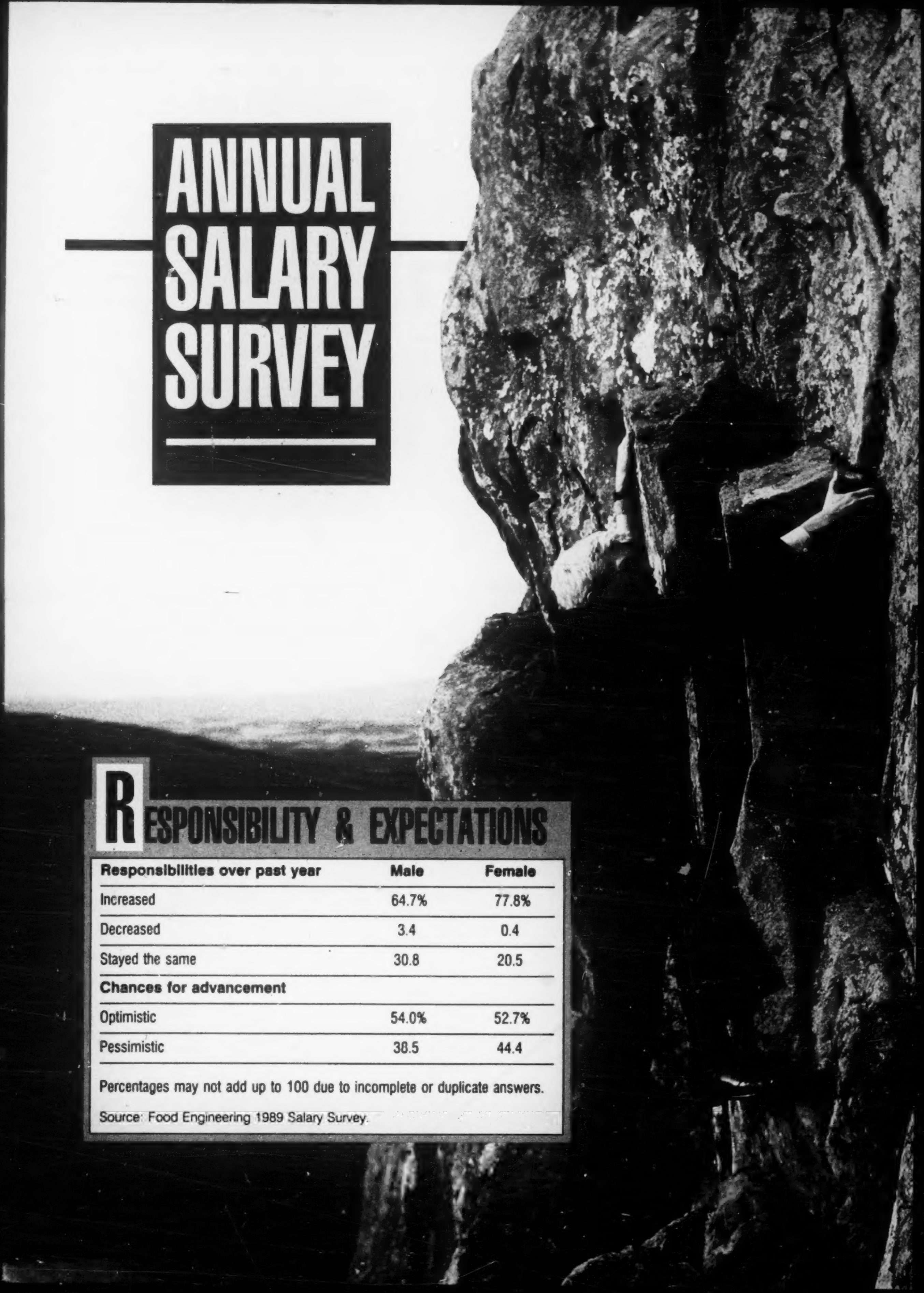

ANNUAL SALARY SURVEY

RESPONSIBILITY & EXPECTATIONS

Responsibilities over past year	Male	Female
Increased	64.7%	77.8%
Decreased	3.4	0.4
Stayed the same	30.8	20.5
Chances for advancement		
Optimistic	54.0%	52.7%
Pessimistic	38.5	44.4

Percentages may not add up to 100 due to incomplete or duplicate answers.

Source: Food Engineering 1989 Salary Survey.

Lack of job security, loss of medical and other benefits, and excess work load are among the concerns expressed in Food Engineering's annual salary survey.

ANN E. PRZYBYLA
Senior Editor

Salary increases in the food industry averaged 7.4 percent during the past year, slightly lower than the 7.8 percent of the previous year, according to *Food Engineering's* annual salary survey. But most people's concerns are not over inadequate salaries since most think they can receive raises by changing jobs—at least most people under 50.

Age discrimination was listed most often as the reason for pessimism about career future. Of the 10,000 people who were mailed questioners, 1,539 responded. And while there were some complaints about low salaries—especially in the dairy field—most people's concerns were in other areas. In addition to age discrimination, these concerns included attitudes towards women, lack of advancement opportunities for technical people who do not go into management, reduced medical and other benefits, hiring outside people, promoting only family members in family-owned businesses, and job uncertainty due to leveraged buyouts (LBOs).

It's no secret that the food industry has been plagued by mergers, acquisitions and LBOs. A number of people responding to *FE's* survey blamed mergers for feeling pessimistic about their chances for advancement. One respondent said that mergers and leveraged buyouts have reduced the opportunity for advancement, while another stated that a recent buyout of his company resulted in hiring from outside rather than promoting from within.

LBOs decrease morale

LBOs are also being blamed for personnel cutbacks, resulting in overwork. But the most serious complaint about LBOs is the lack of job security in the food industry. This lack of security on employees' part is decreasing company loyalty. One respondent stated, "I worked for a company for 30 years and was given a golden boot! I am now employed at another company and am not sure I wish to give it the commitment and trust I have given in the past."

Another person expressed similar sentiments, "LBOs and hostile takeovers are ruining companies and people. It's unmitigated greed. Although salaries are important, they are not the sole purpose for working for most technical or creative people; morale and a job's meaning are also important. We are destroying fundamental work values in the name of short-term profits and get-rich-schemes. Where's loyalty when you can be sold just like any other commodity?"

Women making progress

A continuing area of concern is the fact that women's salaries within the food industry continue to lag behind men's. But the good news is, the gap is narrowing. The average woman's salary in our survey increased 9.0 percent from 1988 to 1989 to reach $33,549, while the average male's salary only increased 7.1 percent for the same period. But that still brought the average male salary to $47,766 in 1989.

In addition, a greater percentage of women had increased responsibilities in 1989 than men (see chart). More women than men also felt pessimistic about chances for advancement. Some of the reasons given are:

- "Women in the food industry still face a lot of sexual prejudice. This is not evident until one gets to know the higher management and company better. Many women are being hired at the entry level; however, their advancement is not as easily obtained as men who are usually given more leeway."
- "Males in this company feel threatened by the possibility of a woman moving up."
- "I am as far as I can go in this company. Women are not promoted to upper management here."
- "I can advance to a certain level, but managerial positions are scarce for women at this company."
- "The ridiculous discrepancy between male and female salaries has to stop. My male counterpart [marketing manager] has been here a year less and makes three times my salary [I saw his pay stub]. If only companies would realize the best asset they have is good, loyal employees. Paying people low salaries does not save money."

Emphasis on education

Not having a college degree (or, in some cases, an advanced degree) was considered by many to be a hindrance to advancement. One person stated, "Most of the promotions are going to younger Ph.D.s. The old-timers are gradually being replaced by younger people."

Some of the respondents, who realized that lack of education is a roadblock to advancement, commented that they are doing something about it. One person expressed optimism for the future since he/she is currently completing a degree at night school. Another person said that while not enough education is an obstacle to advancement, "This is my fault, but I'm working on it."

Willingness to relocate was also often cited as a factor necessary to advance. In some cases, people were willing to pass up opportunities for advancement rather than relocate. Dual career paths was listed as one reason for not wanting to relocate.

Technical versus managerial career path

Opting for the technical route versus managerial in food companies can have some drawbacks. One person expressed pessimism about future advancement since reaching the top of the technical ladder and not having the desire to go into management. Another person asked, "Why are managers paid more than technical staff?"

One comment which summed up the feeling expressed by a number of people was, "The food industry top management is now mainly composed of individuals from the financial or marketing sides of the business. Often, they do not recognize the technical and manufacturing managers are the backbone of this highly detailed business we are in and do not pay them accordingly."

Comments about specific technical areas were also made.

- "The U.S. will not recover its former manufacturing competence unless salary levels for manufacturing engineers are made explicitly equivalent to R&D engineers."
- "Engineering taking a back seat to marketing and finance. Engineers work longer

SALARY (IN $1,000s) BY JOB FUNCTION

	Under 20	20-24.9	25-29.9	30-34.9	35-39.9	40-44.9	45-49.9	50-54.9	55-59.9	60-69.9	70 or more
President	5.3%	3.2%	1.1%	6.4%	5.3%	11.7%	7.4%	6.4%	4.3%	4.3%	44.6%
V.P./mfg.	–	–	1.9	3.9	1.9	5.8	1.9	9.6	5.8	11.5	57.7
V.P./mktg.	–	6.1	6.1	3.0	3.0	9.0	6.1	9.0	12.1	15.2	30.4
Plant mgr.	0.7	4.2	3.5	9.2	14.1	12.7	11.3	13.4	6.3	9.9	14.7
Production supervisor	1.2	7.5	6.2	28.8	13.8	17.5	8.8	7.5	1.2	3.8	3.7
Engineering manager	–	1.5	0.8	5.4	7.7	13.1	10.0	13.1	12.3	20.0	16.1
Project eng.	–	–	1.4	14.3	16.4	22.6	15.8	11.6	10.3	5.5	2.1
Purchasing manager	3.9	9.0	5.1	11.5	17.9	11.5	20.5	5.1	2.6	5.1	7.8
Technical director	–	–	6.2	3.8	11.2	8.8	8.8	11.2	11.2	16.3	22.5
QC manager	4.9	6.3	11.9	20.2	16.8	11.9	9.8	7.7	3.5	4.9	2.1
Food tech.	1.8	9.4	12.3	20.4	15.2	9.9	12.9	5.8	5.3	5.8	1.2
Chemist	1.1	1.1	2.1	8.4	13.7	11.6	8.4	16.8	8.4	15.8	12.6
Sanitation/ maint. mgr.	1.3	3.9	8.6	10.5	9.9	9.9	11.9	9.2	7.2	11.2	16.4

Source: Food Engineering 1989 Salary Survey.

and harder, but don't reap proportionate rewards."

- "It's a shame that our company will pay some clown with an MBA at least $40,000 to start and an experienced QC person with an ASQC certification will take at very minimum [and with yearly moving, etc.] five years to reach that level – even if they have a *real education*."
- "My salary is good in my industry. But compared to marketing and other groups, we in R&D are pikers."

Those who are satisfied

People responding to the salary survey who were happy with their current situation and/or optimistic about their chances for advancement often worked for a company which was in a growth mode and/or where promotions from within the company are common. Or, they were willing to make changes in order to improve their situation.

One person cited optimism for the future but added, "not at this company." Another stated that the opportunity for advancement is always there, "if I prefer to relocate."

The need to change jobs was often cited as necessary to obtain a satisfactory salary. One respondent stated, "I have reached my

MEDIAN SALARY BY SEX

	1989	% increase over 1988
Male	$47,766	+7.1
Female	33,549	+9.0

Source: Food Engineering 1989 Salary Survey.

MEDIAN SALARY BY EDUCATION

High school or less	$39,374
Some college	38,909
B.S.	44,635
M.S.	52,638
Ph.D.	59,721

Source: Food Engineering 1989 Salary Survey.

MEDIAN SALARY BY EXPERIENCE

Less than 6 years	$34,957
6-9	38,399
10-14	43,818
15-19	46,483
20-24	52,749
25-29	52,856
30 or more	54,731

Source: Food Engineering 1989 Salary Survey.

MEDIAN SALARY BY REGION

Geographic region	Median salary
New England	$42,999
Mid-Atlantic	49,122
East North Central	42,601
West North Central	44,258
South Atlantic	44,558
East South Central	43,332
West South Central	44,999
Mountain	38,749
Pacific	46,817

Source: Food Engineering 1989 Salary Survey.

present salary level through several job changes, I feel I would not have achieved this level by staying with one company. My range of experience has made me more valuable to the industry."

Some companies do offer employees opportunities to advance both in knowledge and salary, rather than lose them to other companies. For example, one person stated that being in an R&D environment, he/she has the opportunity to acquire any skill–chemistry, engineering, flavor, sensory–desired. Being young, energetic and flexible was listed as a reason for being optimistic; while another stated that management's willingness to listen to ideas and problems was an indication of a positive future. On the other hand, lack of communications was often listed as a major stumbling block to effectively performing one's job.

As food industry managers struggle to keep valued employees content in an uncertain business environment, a number of factors need to be considered in addition to salary. Only one person said a raise was one of the greatest obstacles hindering more effective job performance–the most common complaint was being understaffed or overworked. Today, quality of life is being measured by factors such as where one lives, having control over one's life (including having input on decisions concerning their working environment) and being valued, in addition to how many possessions one has.

TITLE BY EDUCATION & SEX

Job title	High school or less	Some college	B.S.	M.S.	Ph.D.	Male	Female
President	10.6%	28.7%	41.5%	14.9%	4.3%	93.6%	5.3%
V.P./manuf.	5.8	17.3	48.1	25.0	3.8	98.1	1.9
V.P./marketing	6.1	24.2	57.6	12.1	–	87.9	12.1
V.P./R&D	–	5.3	10.5	42.1	36.8	89.5	10.5
Plant manager	12.7	28.9	44.4	14.1	–	95.1	4.2
Operations/mfg. prod. mgr./sup.	12.5	23.8	53.8	8.8	–	90.0	10.0
Engineering mgr.	3.8	21.5	53.1	21.5	–	98.5	0.8
Project/proc. eng.	0.7	13.0	69.9	15.8	–	88.4	11.0
Packaging mgr.	15.0	30.0	40.0	15.0	–	100.0	–
Purchasing mgr.	10.3	35.9	46.2	7.7	–	79.5	20.5
Technical dir.	–	2.5	47.5	23.8	26.2	85.0	13.8
QC manager	1.4	16.1	61.5	17.5	3.5	69.2	29.4
Fd. tech./chemist	–	8.2	54.4	25.7	11.7	64.3	35.1
Marketing/prod./ sales manager	–	18.9	53.7	27.4	–	80.0	18.9
Sanit./maint. mgr.	14.3	42.9	36.7	6.1	–	100.0	–
Trans./dist. mgr.	15.6	31.2	40.6	12.5	–	78.1	21.9
Purch. agt./buyer	–	40.0	46.7	13.3	–	40.0	60.0

Percentages may not add up to 100 due to incomplete or duplicate answers.

Source: Food Engineering 1989 Salary Survey.

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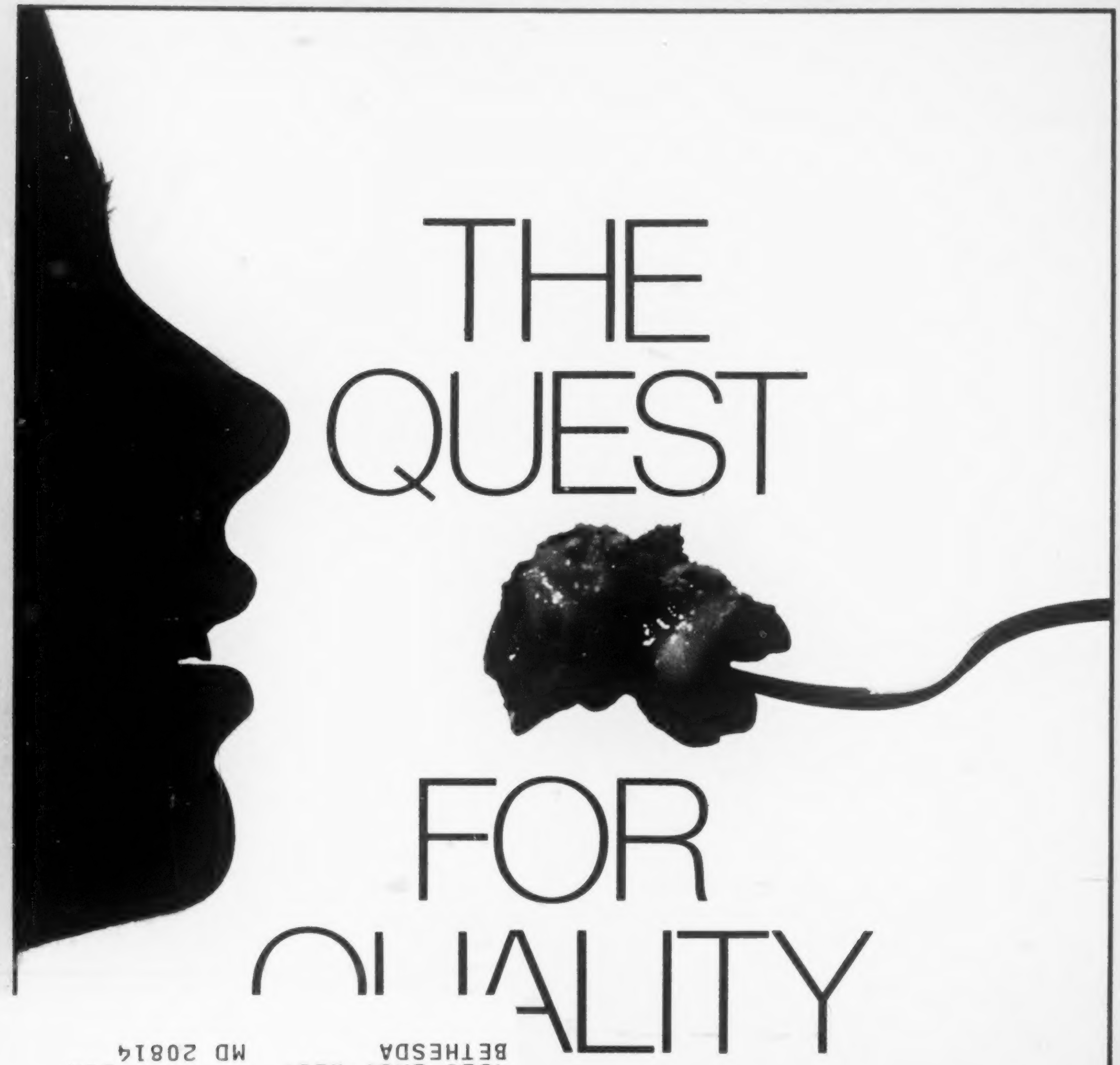
CHILTON'S
JANUARY 1990

FOOD ENGINEERING

SINCE 1928, THE SOURCE ON PROCESSING, PACKAGING, AND PRODUCT DEVELOPMENT



THE QUEST FOR QUALITY

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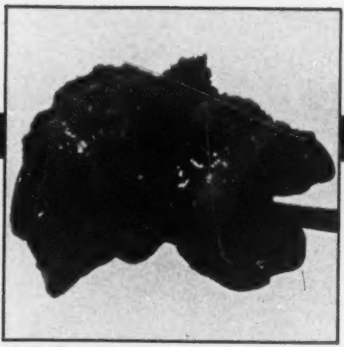
CONGRESSIONAL INF SVC.1113
4520 EAST-WEST DIR
BETHESDA MD 20814

FOOD ENGINEERING



ABOUT THE COVER

Quality is a simple word, but its application in the food industry is complex. Fulfilling consumer expectations, while producing low-cost quality products is perhaps the most difficult challenge the processor has to face.

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SPECIAL EMPHASIS

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RICE CAKES: **PAGE 14**

ENGINEERED FOODS

23 **Low-fat Spreads**
Low calorie spreads as replacements for margarine signal a new era in fat reduced foods.

28 **Marketplace—Egg Substitute**
New egg substitutes offer reduced cholesterol levels.

31 **Encapsulated Ribotide**
The encapsulation of Ribotide® with edible hydrogenated oil and fat allows for new applications.

32 **Increased Enzyme Use**
Enzyme use continues to grow as more and more special enzyme systems are developed.

34 **Choices—The New RDAs**

FOOD PACKAGING

46 **Milan Hosts First Packintec Trade Fair**
Packaging exhibition in Italy showcases international equipment, conferences, and a display by the USSR.

48 **New Generation of Cartoners**
The IMA A90 features a unique carton transfer system: Cartons are not moved by walking beams, but by an upper and a lower belt.

48 **First Western Exhibit for Soviets**
The presence of the Soviet Union at Packintec '89 in Milan stirred great interest among show attendees.

52 **Improved Shelf Life**
New thermoforming/vacuum skin-packaging machine combines VSP with MAP.

FEATURES

62 The Quest for Quality
Quality has come to the forefront of the food industry. Consumers now demand quality, and won't settle for less.

72 Risk: How To Talk About It
The Alar incident caught the food industry unprepared. Before the dust settles, other controversies will rise.

77 Food and Dairy Expo Post-show Report
DFISA combines 40th biennial show with first-ever conference to show what's new in food and dairy technology.

87 Gums, Starches and Thickeners
Sugar and fat are out, gums and starches are in. Low-cal foods break new ground in taste with thickeners.

PROCESSING & CONTROL

92 CIM at General Foods
Kraft General Foods applies corporate-wide CIM strategy to its aseptic-processing plant.

94 Chilled Foods Distribution
Liquid nitrogen and CO_2 help maintain tight refrigeration control in trucks.

94 Clinging Sanitizers
Gel cleaning is the choice of bakery since detergents must cling to vertical surfaces for a long time.

95 Unique Aseptic Design
Aseptic-processing plant expects FDA approval for low-acid aseptic processing and packaging.

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187 Product news from the Food and Dairy Expo

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micro-encapsulation techniques and is free flowing, with consistent particle size distribution. Eighty percent of the diameters of Ribocoat particles fall between 0.3 mm and 0.6 mm.

The manufacturing of Ribocoat involves dissolving Ribotide in hot water and spray drying it. The spray-dried Ribotide is then blended with edible hydrogenated oil and fat which has been melted and the mixture is micro-encapsulated.

The heating process during food processing or cooking inactivates phosphatase and, at the same time, melts away the coating, enabling Ribotide to be released.

Ribocoat was tested in a number of products. Typical sausage formulations used by major Japanese meat packers were among the products. Ribocoat Type-25 was added to the formulation at 0.100 percent level (or the equivalent of 0.025 percent level Ribotide). For the control, Ribotide was added at 0.025 percent level. A comparison of Ribocoat versus Ribotide in a sausage made with meat having weak phosphatase activity is shown on the graph on the preceeding page.

Graphs comparing Ribocoat to Ribotide in kamaboko (surimi cakes) and batter are also available.

Takeda U.S.A., Inc., 8 Corporate Drive, Orangeburg, NY 10962-2614 **Circle 238**

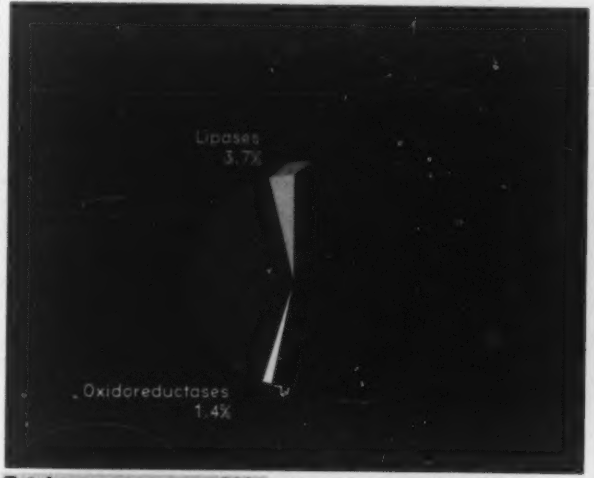
Enzyme usage grows as special enzyme systems are developed

The value of industrial enzymes consumed by the food industry will reach $286 million a year by 1993, according to the report, Food Industry Enzymes Market In the U.S., published by Frost & Sullivan, Inc. (F&S), a New York-based market research firm. The report examines the prospects for more than 17 categories of enzymes, developing yearly dollar totals through 1993. The carbohydrases are the largest product group and will remain so, climbing from $116 million in 1988 sales to a projected $145 million by 1993. For example, enzyme preparations of carbohydrase enzymes which can be used to delay the staling of breads were introduced by Novo Laboratories, Inc. earlier this year (see *Food Engineering*, March 1989, p. 57).

Rohm Tech, Inc., Malden, MA, also offers an enzyme system which retards staling in breads—*Veron ESL Super*.

Several enzyme systems have been introduced to improve the quality of multi-grain breads, which are increasing in popularity. Enzyme Development, New York, NY, offers *Enzeco®* hemicullulase baking enzyme which was designed to modify the pentosans, xylans, beta-glucans and other related compounds of various non-wheat grains. Enzeco enzyme is essentially free of protease and amylase activity.

An enzyme especially formulated to solve handling problems associated with processing baked goods is *Genencor Experimental Product 381* from South San Francisco, CA-based Genencor, Inc. It is standardized on its ability to break down pentosan gums and also contains significant beta-glucanase activity.



Total enzyme usage within the food industry, currently at $216.1 million, is expected to expand. (Source: Frost & Sullivan, Inc.)

The dry enzyme system acts in dough systems to release water normally bound by pentosans, resulting in several quality improvements. For example, more extensible dough is developed as flour constituents become more fully hydrated.

Current enzyme research involves examining the use of enzymes to reduce cholesterol in foods, mainly dairy products, with reported cholesterol reductions of between 50 and 80 percent, states F&S's report. "If consumer interest in reduced cholesterol or cholesterol-free foods continues and appropriate production methods can be found, the potential market is $100 million annually," it adds. (See *Food Engineering*, December '89, p.57.)

Genencor, Inc., 180 Kimball Way, South San Francisco, CA 94080 **Circle 242**

Enzyme Development, 2 Penn Plaza, New York, NY 10121 **Circle 241**

Rohm Tech, Inc., 195 Canal Street, Malden, MA 02149 **Circle 240**

Novo Laboratories, Inc., 33 Turner Road, Danbury, CT 06810-5101 **Circle 239**

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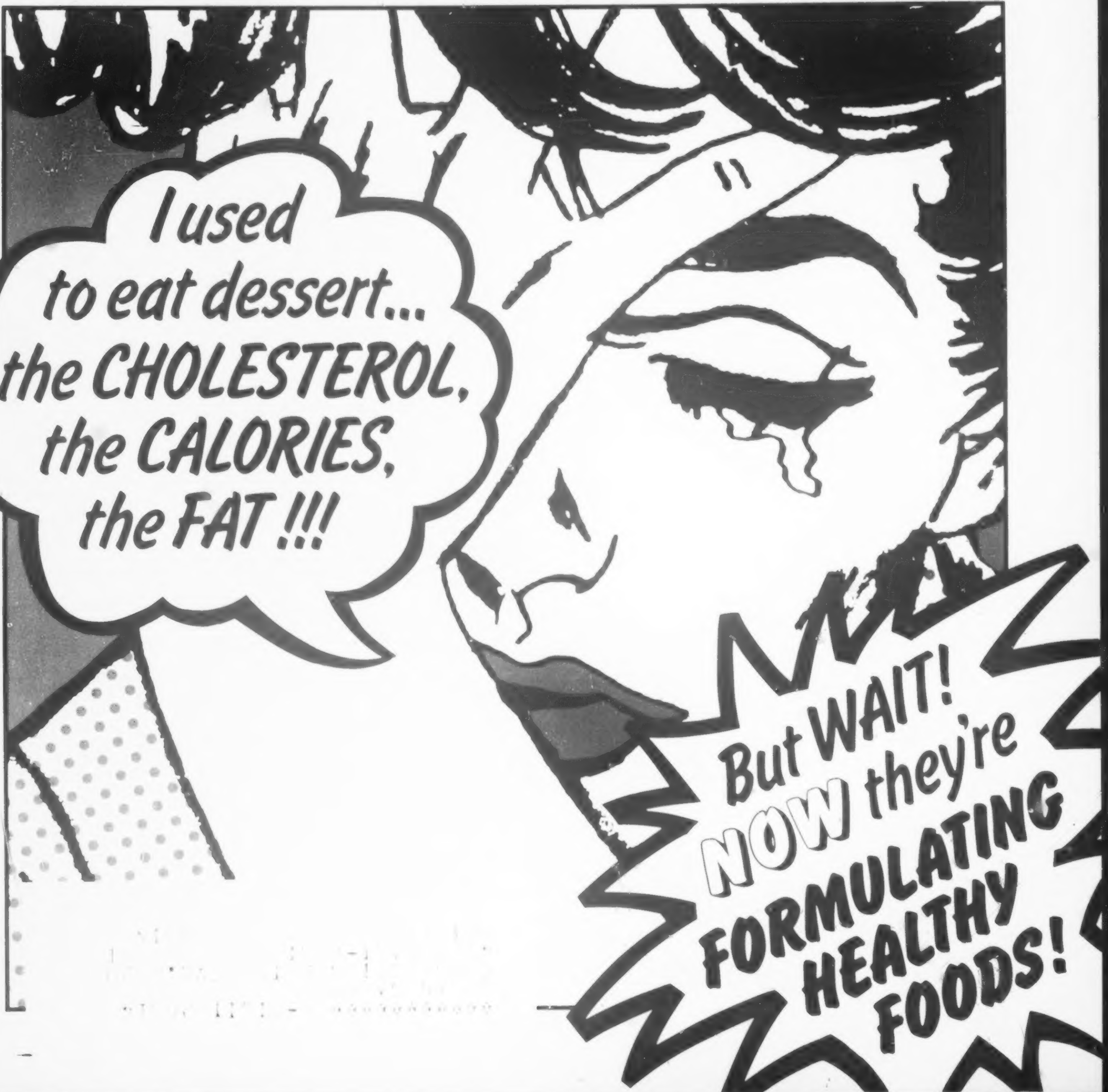
CHILTON'S

FEBRUARY 1990

FOOD ENGINEERING

SINCE 1928, THE SOURCE ON PROCESSING, PACKAGING, AND PRODUCT DEVELOPMENT


I used to eat dessert... the CHOLESTEROL, the CALORIES, the FAT !!!
But WAIT! NOW they're FORMULATING HEALTHY FOODS!

FOOD ENGINEERING

ABOUT THE COVER

The interest in healthy eating is being addressed by food manufacturers with an onslaught of "healthy" foods. A major roadblock to the development of these foods is determining what constitutes a healthy diet.
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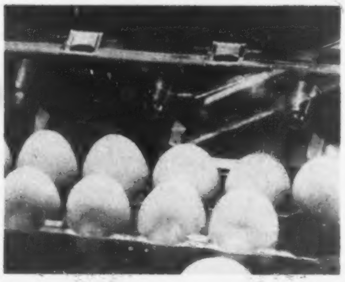
SPECIAL EMPHASIS

PAGES 67 TO 69



CLEAR CARTON: **PAGE 34**

ENGINEERED FOODS

20 Improved Functionality of Ingredients
The formula for being a successful food manufacturer is changing from being a low-cost producer to offering quality products.

22 Marketplace—Pasta Sales Climb
Growth of traditional dry pasta, fresh pasta and pasta salads is expected to continue.

24 Specialty Dextrose Increases Absorption
Cantab is a specialty dextrose whose unique structure allows it to absorb substantial quantities of various liquids.

24 Natural Flavors for Low-fat Foods
A line of flavors was developed using a proprietary process involving reaction chemistry.

FOOD PACKAGING

34 Clear Egg Cartons Crack New Market
The *ViewPak* carton is designed to showcase premium, extra fresh, brown and low cholesterol eggs.

36 Du Pont Announces Award Winners
Six food packaging developments for plastic packaging innovations were announced at the National Food Processors Association annual conference in San Francisco.

38 New Recycling Project Unveiled
This project focuses on industrial scrap produced during multilayer sheet coextrusion and rigid container thermoforming.

40 Trendwatch—Looking Back

FEATURES

49 Formulating Healthy Foods
Reducing fats, both saturated and overall, and increasing fiber content of foods are the major areas of concentration in formulating healthier foods.

61 Food Label Reform: What's Needed?
This article is based on a roundtable discussion conducted by *Food Engineering* at the NFPA Fall Executives Conference.

67 Warehousing—Putting It Under One Roof
Changes in the food industry have greatly affected warehouse designs and distribution patterns. Without a doubt, cost reduction and distribution efficiency are the key components for a good business strategy.

PROCESSING & CONTROL

72 DFISA Conference Profiles Dairy Plants
Food/dairy-plant design is impacted by three major issues: regulatory, labor/inventory and business factors.

74 U.S. Designs Food Plants in Poland
A Chicago firm recently completed two fruit-processing/freezing plants for Polimex-Cekop in Poland.

76 Infrared Thermometers Ease Maintenance
Infrared thermometers can be clipped to a belt or carried in a tool kit for quick, easy monitoring of equipment.

76 Microwave 'Retorts' Start-up in Europe
An Omac *Micronix TP* continuous, pressurized microwave pasteurization/sterilization system will soon "retort" shelf-stable prepared meals packaged in a barrier-layered dual-ovenable PET tray.

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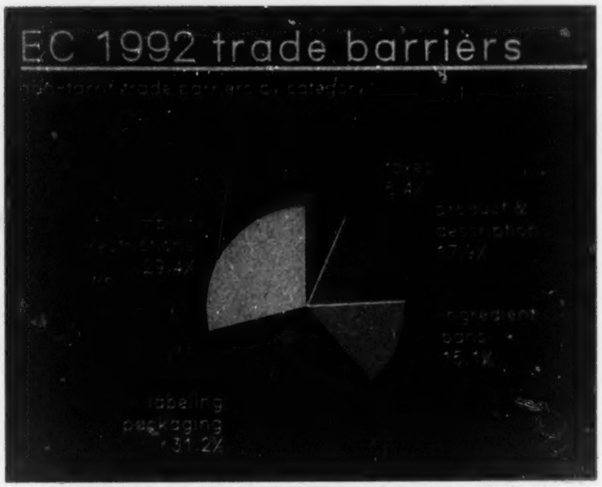
Europe steps closer to 1992

Food and beverage firms can expect to face more barriers than any other industry when the European Community (EC) finally is open for business at the end of 1992.

However U.S. firms might find it worthwhile to wade through the difficulties to be able to reach a unified EC which will boast of 320 million consumers with a combined purchasing power of $4 trillion, according to the U.S. Department of Agriculture (USDA)/Economic Research Service.



More than 200 food trade barriers currently exist in the EC. (Source: USDA/Economic Research Service.)

Correction

In the 12th Annual New Food Plant Construction *story appearing in the November 1989 issue of* Food Engineering, *Webber/Smith Associates was incorrectly named as the architectural firm of the ASK Foods plant in Palmyra, PA. The correct firm is Facilities Design, Inc. of Lancaster, PA.*

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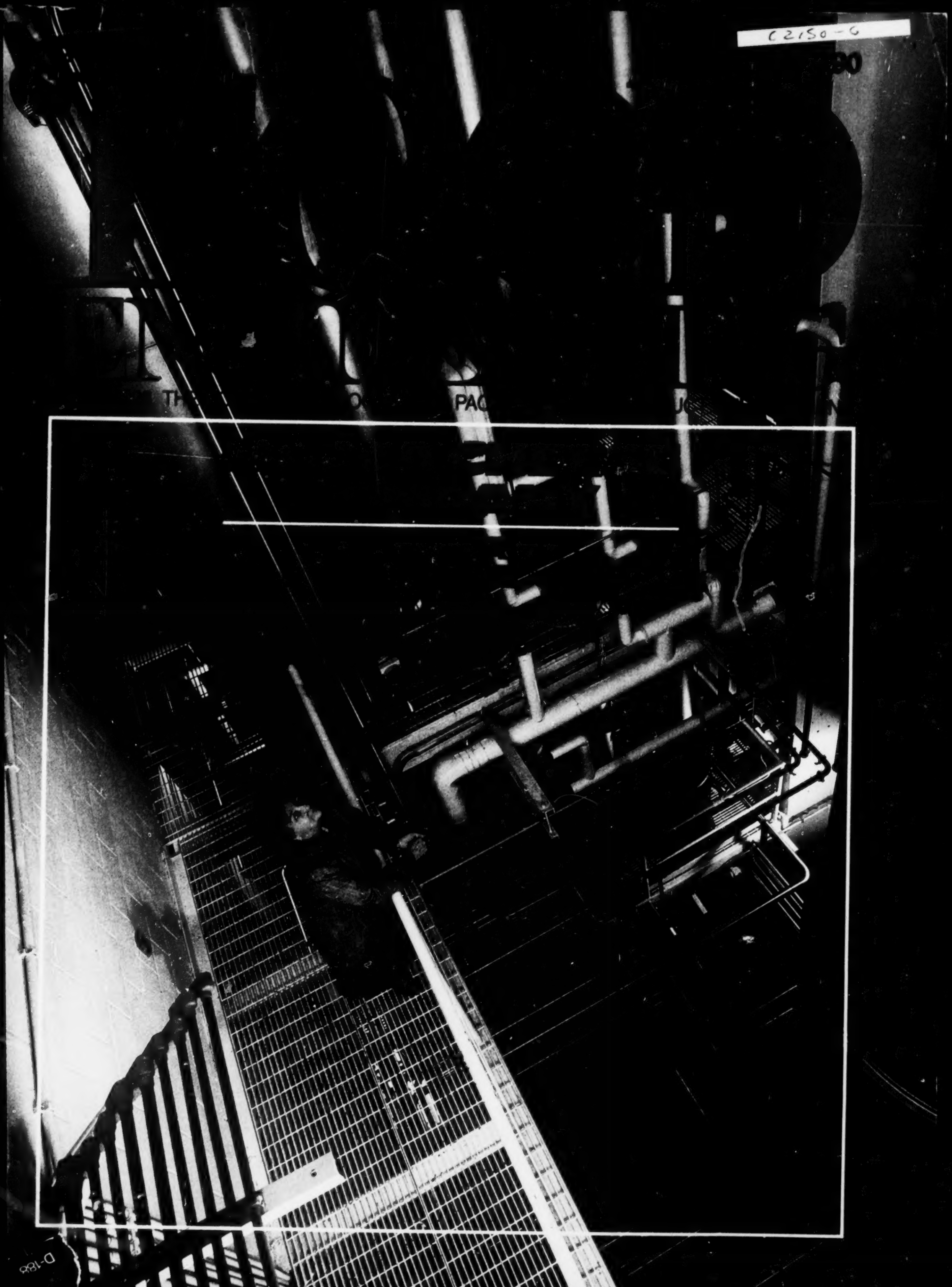

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FOOD ENGINEERING

ABOUT THE COVER

FE's new plant of the year is Mazza Cheese Co. – a dream attained by the quiet persistence of a determined woman.
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Weight Watchers®
APPLE CHIPS
MADE FROM DEHYDRATED APPLES

SPECIAL EMPHASIS

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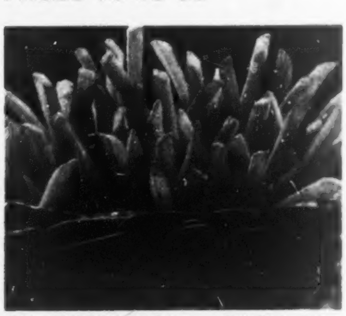

OIL RESEARCH: **PAGE 24**

ENGINEERED FOODS

24 Major R&D Effort Pays Off at P&G

Procter & Gamble's reputation for investing in long-term basic research is legendary. Its 1988 bill for R&D was $652 million.

26 Marketplace – New Microwave Meals

Microwaveable entrees are being developed specifically for children as well as for adults.

28 Flavor Vocabulary for Communications

A flavor vocabulary has been developed by McCormick to improve communications between the flavor maker and the food processor during the product development stage.

31 Choices – Tobacco Ownership of Food

FOOD PACKAGING

44 Degradable Packaging Films At Issue

The market in degradable packaging films is driven by the common misperception that degradable materials will eventually disappear in landfills or evaporate into thin air when littered.

46 Hot Fill Cup Debuts At FEAST

Packaging for a new juice line can be hot filled without the sides panelling once the product cools.

46 Biodegradable Flexible Foodwraps

Rutgers scientists have affirmed the biodegradability of flexible vinyl foodwrap films.

50 Waste Management Steams Ahead

After success recycling solid waste, one company has begun tackling society's formidable foe: polystyrene.

FEATURES

62 New Plant of the Year
Mazza Cheese Co.'s new mozzarella plant processes more than 1 million lbs. of milk per day, and combines unique technologies with unprecedented environmental standards to satisfy the booming demand for pizza here and abroad.

73 Equipment Buyers Survey
FE's Executive Advisory Panel predicts further growth and million dollar budgets in equipment purchases.

79 Packaging Films—Protection 'in the Bag'
Films are working harder than ever to increase product shelf life. Metallized films increase the shelf life of products and their sophisticated graphic appeal helps get products off the shelf.

PROCESSING & CONTROL

86 Cook-chill System Cuts Labor
Specialized process dramatically reduces chance of spoilage while cutting labor costs.

88 Dreyer's 'Fourth Shift' Controls Costs
Microcomputer systems, Fourth Shift software and a local area network link three ice cream plants and control production costs.

88 Core Technology Improves Frozen Corn
Coring cobs can upgrade the quality of frozen corn-on-the-cob, according to a Cornell professor.

90 Plastic Belts for Harsh Environments
Ultra-violet (UV) stabilized plastic conveyor belts replaced wire-mesh belts to eliminate downtime in the rugged, corrosive job of handling field-fresh tomatoes.

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FEAST, not famine in San Francisco

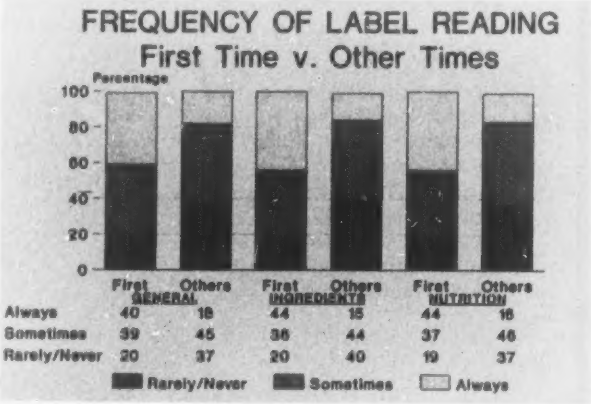
Stephen Presser, moderator, stalks members of a panel of nine food company heads and journalists during "Socratic method" segment of NFPA session on "Fear, Trust and Acceptable Risk." (Source: NFPA.)

*The NFPA (National Food Processors Association) convention and exhibit in San Francisco in February drew about 2,500 convention attendees and a little over 100 exhibitors. Designated FEAST (Food Exposition About Science and Technology), the get-together exposed processors to a variety of the significant issues of the day (liability, overhead management, marketing to the over-50 segment). But the keynotes struck during the four days were clearly **risk assessment, risk communication, and labeling**, areas that have been churning the industry for some time, and areas where NFPA feels it can provide significant leadership. During one lively debate among industry leaders and reporters, it was pointed out that business must put forward food company voices that are introspective about the industry, rather than the reactionary PR campaigns that look to plug up problems after it is too late.*

'Seize the day' urges president of Curtis Burns Foods

*Cognizant of the pressure the food industry has been under from the pesticide scare, and hoping to stir the industry to seize the moment to guide its own destiny in conflicts yet to come, David McDonald, president of Curtice Burns Foods and outgoing chairman of NFPA, outlined a "new mission" for the association at their annual meeting in San Francisco. This mission "clearly spells out the future role of the National Food Processors Association to become the **industry's principal scientific resource** in dealing with issues of public policy." The food industry, and the scientific organizations that support it, "are now playing in a new public arena with skillful adversaries often driven not necessarily by the desire to do good works...but by self-serving financial and sometimes political considerations." And so McDonald, in his closing action as chairman, called for recruits to "a crusade...to join together to more effectively perform in the adversarial arena." Senior management must take public issues seriously and work closer with trade associations, he added.*

New labeling study unveiled



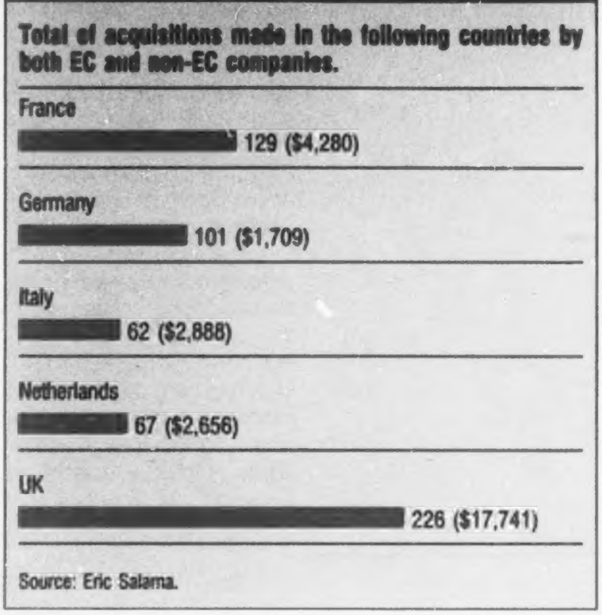
The NFPA study on consumer label reading habits was finally unveiled. (Source: NFPA.)

*The long-awaited NFPA study, "Food Labeling and Nutrition: What Americans Want," was the focus of a major afternoon session at the association's annual convention. The session, "Consumers Speak Out on Labeling," covered areas like frequency of label reading by consumers, influence of labeling on **purchase decisions**, products for which ingredient and nutrition labeling has the greatest/least influence, type of information read on labels, how sufficient the information was, clarity of information provided by the labels, and the rating by consumers of six label formats. Copies of the study are available from the National Food Processors Association. Contact Donna Smith at (202) 639-5934.*

If you're waiting for 1992, look out, it's here

According to Eric Salama, associate director of the Henley Centre in London, 1992 is happening already. In his remarks to the annual meeting of FPM&SA (the Food Processing Machinery & Supplies Association) in February, Salama pointed out that while in the past pan-European companies were usually American and Japanese, not European, that has changed with the accelerating merger activity. Also, European companies want to roll out standardized product rather than accept the old saw that local tastes make this impossible. Increasingly, Europeans identify themselves as "European," not as nationals of specific countries.

EC Acquisitions, 1988 (total number and millions of dollars)



Source: Eric Salama.

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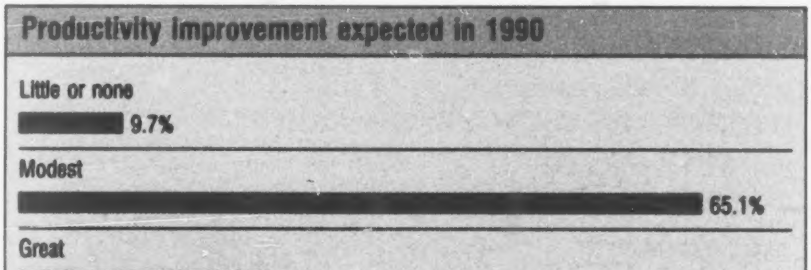
PROCESS EQUIPMENT BUYERS SURVEY

Our Executive Advisory Panel crystal ball sees further growth and million dollar budgets.

PATRICIA M. DILLON
SENIOR ASSOCIATE EDITOR

While Standard & Poor's outlook for 1990 described the economy as "a featureless landscape," *Food Engineering*'s most recent survey of its Executive Advisory Panel has revealed undiminished enthusiasm. What else could explain the willingness of almost a quarter of the survey respondents to budget $4 million or more for new equipment? And approximately 23 percent were confident enough to earmark one to four million dollars for capital investments.

Obviously, expectations for increased production is fueling preparations for this equipment buying spree. Approximately 37 percent of the sur-



Productivity improvement expected in 1990

Note: Total of numbers shown may be more or less than 100% due to multiple answers or no response.

Source: Food Engineering Executive Advisory Panel.

EQUIPMENT BUYERS SURVEY

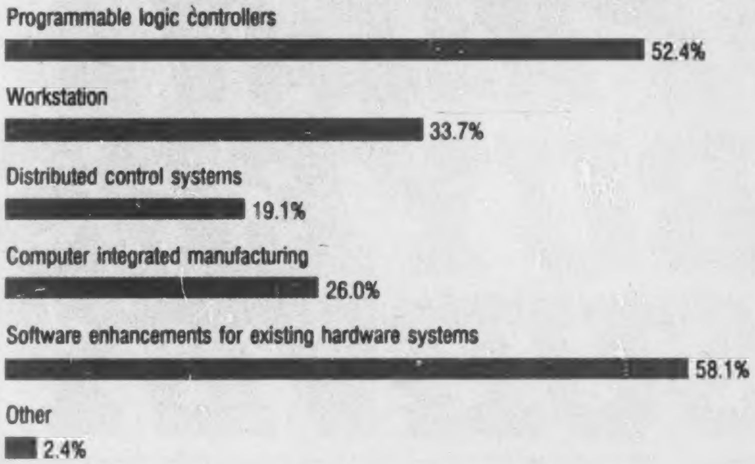
vey respondents plan to increase their production by more than 10 percent and an additional 31 percent are ready to increase manufacturing anywhere from six to 10 percent.

As could be expected, small companies have the greatest potential for growth and are inherently more flexible than their larger counterparts. Our survey showed just over half of the companies with less than 100 employees were planning to increase production by more than 10 percent while only a third of their competitors with 500 or more employees were willing to do so.

Results from our survey show that respondents appear to be getting maximum use of their equipment and facilities since most said they were at 80 to 89 percent efficiency. Dairy and canned foods producers said their efficiency was within the 80 percentile range while frozen food producers nudged their efficiency rate into the 90 to 99 percent range.

To further the quest for efficiency, approximately 64 percent of our panel expected to retrofit their present facility while 39 percent were ready to invest in new construction. And a substantial 61 percent of the respondents

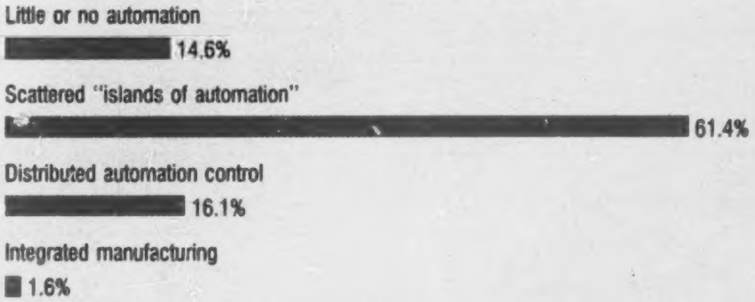
Process control purchases planned for location in 1990



Note: Total of numbers shown may be more or less than 100% due to multiple answers or no response.

Source: Food Engineering Executive Advisory Panel.

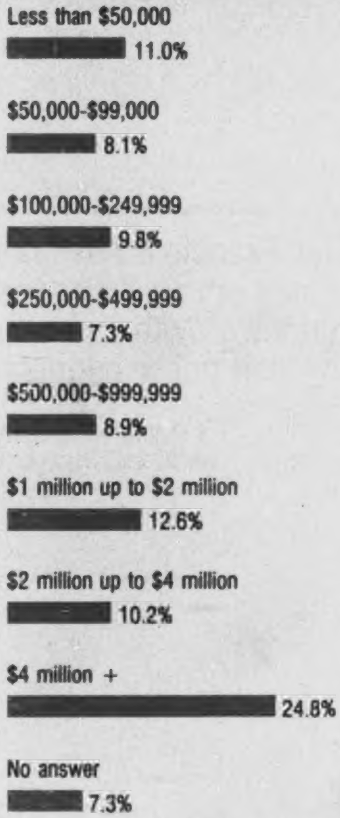
Estimate of company-wide automation



Note: Total of numbers shown may be more or less than 100% due to multiple answers or no response.

Source: Food Engineering Executive Advisory Panel.

Company-wide money budgeted for purchase of equipment, 1990



Source: Food Engineering Executive Advisory Panel.

were ready to improve plant layout and design.

Equipment upgrades are expected to be made by 89 percent of the panel with a more than half of the frozen food, confectionery, fats and oils, cereals, meat, bakery, dairy, flavor, canner, and beverage producers saying they were in "moderate" need of better equipment.

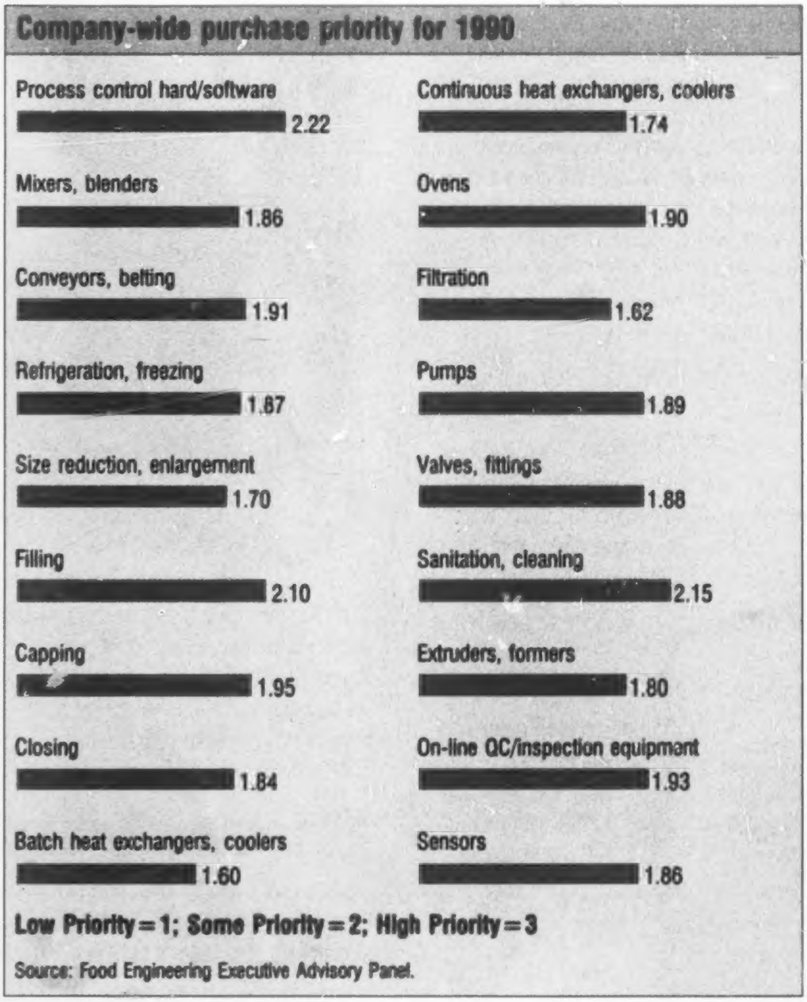
Panelists also voiced their concerns with packaging and process control. Respondents called for better line monitoring, fill weight control, material loss monitoring and bulk material handling.

Computer Integrated Manufacturing (CIM) was a hot button. Many companies are struggling to install CIM while others such as one East Coast food manufacturer said, "We must establish CIM at one plant soon to prove benefits before our 'champion' retires." A director of technical services from the South wants to "assemble and merge data from 'islands of automation.'" Another engineer recognized the importance of using automation to maintain product quality and not use it simply as a way to reduce a plant's headcount. However, most participants expect automation to improve productivity, product quality and cut labor.

It is interesting to note that more than half of the companies polled described their place on the automation scale as being "scattered islands of automation."

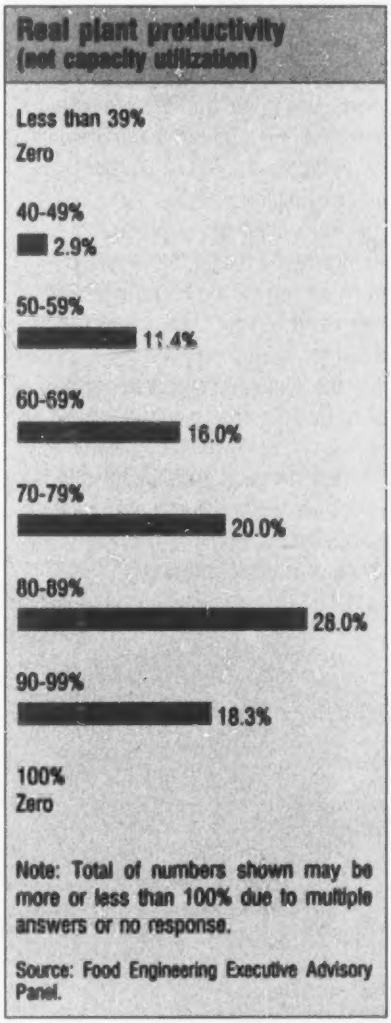
Only two percent described themselves as being completely integrated with automation from top to bottom while 15 percent said they had little or no automation. The majority, obviously, are in between these extremes.

Unlike Wall Street economists who only see a "featureless landscape," members of the food industry see a panorama of opportunity from the creation of new products to the discovery of new markets. Suppliers will do well to note the issues raised by our panel to avoid being a part of the landscape that is overlooked.


Company-wide purchase priority for 1990

Low Priority=1; Some Priority=2; High Priority=3

Source: Food Engineering Executive Advisory Panel.


Real plant productivity (not capacity utilization)

Note: Total of numbers shown may be more or less than 100% due to multiple answers or no response.

Source: Food Engineering Executive Advisory Panel.

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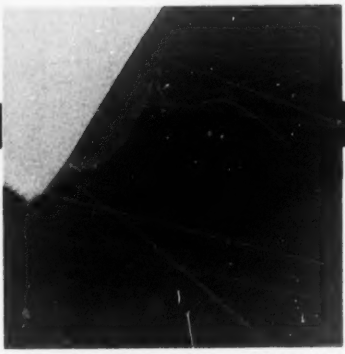

ABOUT THE COVER

The hottest new product categories for 1989 were healthy dairy and bakery foods, oat bran added foods, microwaveable meals, frozen novelties and new age drinks.

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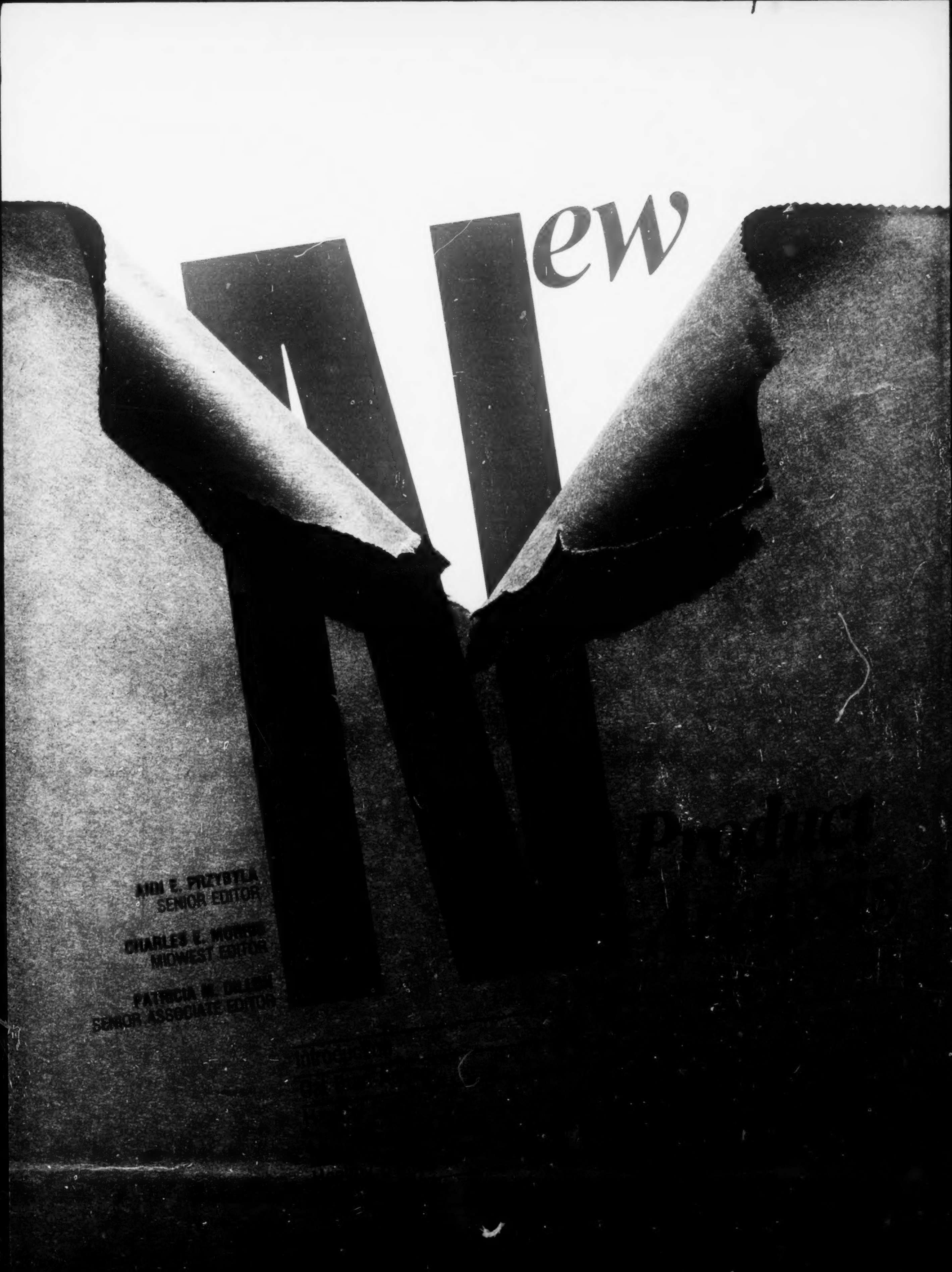

New Product

ANN E. PRZYBYLA
SENIOR EDITOR

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PATRICIA M. DILLON
SENIOR ASSOCIATE EDITOR

While up from last year, the number of new foods and beverages introduced in 1989 did not reach the record number introduced in 1987. Total food and beverage introductions in 1989 were 3,477, according to Marketing Intelligence Service Ltd., a new product tracking firm based in Naples, NY.

"Measures of new product activity in 1989 show that marketers are trying more than ever to minimize their risks," said Richard Lawrence, president of Marketing Intelligence. "The explosive growth in the numbers of new products that occurred in the mid-80s is over. Two thirds of introductions were line extensions – new varieties, improved formulations, new sizes, or new packages for existing brands. These measures indicate that new product marketers are being more deliberate and focused in their attempts to win scarce shelf space and gain the attention of jaded consumers."

Food companies are also feeling increased pressure from supermarkets for strong support of new products. According to a study by FIND/SVP (New York), trade buyers are giving new products six months to reach a significant level of success.

"Consequently, they [trade buyers] say manufacturer introductory programs must offer heavy advertising and promotions to the consumer that raise brand awareness and offer buying incentives," stated Pete J. Allen, FIND/SVP vice president. "They must also offer allowances to the trade to offset their costs of slotting, promotions and advertising."

Food manufacturers concur that brand awareness is important. "Good brands are the best assets you can buy – they have real value and will deliver in the future," said William D. Smithburg, chairman and CEO, The Quaker Oats Company (Chicago, IL). He added that new products are not desirable, they are mandatory.

Large companies continue to dominate the lists of the most frequent product marketers, according to Marketing Intelligence. And, these large

1989 food introductions

Food	Total intros.	New brand	Line ext. w/in brand	Other (i.e. new package)	Total SKUs
Baby food	8	1	–	7	21
Bread & bread products	136	37	2	97	272
Cake mixes & cake frosting mixes	13	4	–	9	24
All other baking mixes	42	9	–	33	71
Catsup	8	3	–	5	10
Cereals	132	25	4	103	191
Cheese	82	33	1	48	260
Chewing gum	22	1	1	20	37
Chips	96	32	2	62	215
Chocolate candies	114	39	1	74	387
Non-chocolate candies	81	21	–	60	235
Cookies	158	54	4	100	381
Crackers	58	12	–	46	84
Dairy substitutes	9	2	–	7	11
Other non-beverage dairycase products	17	7	–	10	21
Desserts	27	6	1	20	49
Special diet foods	51	12	1	38	86
Entree mixes	17	5	–	12	36
Fish	50	13	1	36	108
Fruits	32	15	–	17	103
Ice cream & ice cream cones	136	52	5	79	352
Jams, jellies, marmalades, sweet butters	49	19	3	27	203
Margarine, butter, etc.	16	8	–	8	30
Mayonnaise & imitation mayonnaise	19	1	–	18	24
Meals & entrees	148	53	4	91	389
Meat meals & entrees	40	9	1	30	79
Fish meals & entrees	17	6	–	1	61
Poultry meals & entrees	37	3	–	34	90
Vegetable meals & entrees	4	–	–	4	6
Meat	55	25	–	30	133
Mustard	34	14	1	19	89
Non-stick surfacing products	5	–	–	5	6
Nut butters	22	5	1	16	44
Nuts & seeds	22	10	–	12	46
Oil & shortenings	35	14	1	21	80
Pasta products & combos	55	20	2	33	225
Pastry & baked products	96	27	1	68	257
Pickles, relishes, olives, chutney, etc.	45	19	–	26	137
Popcorn	57	25	–	32	125
Poultry	45	9	–	36	123
Prepared salads	14	5	1	8	42
Rice & rice combos	42	12	–	30	121
Salad dressings	58	16	3	39	134
Salad toppings & dips	18	2	–	16	34
Spaghetti sauces & other pasta sauces, pizza sauce	34	11	–	23	84
Other sauces, gravies & condiments	117	41	5	71	243
Savoury spreads	8	2	1	5	16
Snack bars	23	7	–	16	49
Other snacks	105	34	1	70	239
Soup	61	20	–	41	136
Spices, extracts & seasonings	102	34	1	67	266
Staples	43	18	2	23	70
Sweet toppings	48	8	2	38	102
Vegetable protein products	28	9	1	18	54
Vegetables	87	24	1	62	174
Yogurt and yogurt imitations	40	25	–	15	154
Total	2918	918	55	1946	7019

Source: Productscan®, Marketing Intelligence, Service Ltd.

companies are slowly increasing their share of total introductions in the food and beverage industries.

"The risks of new products for small companies are generally lower than for large companies, and small companies have historically accounted for disproportionately large shares of new products compared to their shares of sales," commented Lawrence. "The increasingly tough climate for new products seems to be harder on the smaller companies. The marketing muscle and the extent of their existing shelf allocations give larger firms an edge in getting new items into the store."

The level of innovation shown in 1989 introductions was slightly above that for 1988. The innovative rating for 1989 was 13.4 percent compared to 12.1 percent in 1988 and 11.4 percent in 1987, according to Marketing Intelligence. The innovation rating identifies the proportion of total introductions that offer consumers something significantly new in at least one of five areas: formulation, positioning, packaging, technology or "previously unmet."

Lawrence pointed to the growth in importance of packaging and technological innovations as a sign of more emphasis on instrinsic product differentiation. Although formulation innovations are the most prevalent, they often appear to be marketing gimmicks rather than obvious improvements, he added.

A number of significant trends occurred during 1989. Health became even more important. Over half of all new food and beverage launches employed some kind of nutritional descriptor promising more or less of something, reported Marketing Intelligence. Fat levels were reduced in numerous products, and bran—especially oat bran—was added to even more foods. These trends are expected to continue—especially as the average age of the U.S. population increases since health concerns increase with age.

The major trends in 1989 new food and beverage introductions, as identified by *Food Engineering*, are: oat bran-added, healthy dairy, microwaveable meals, new age drinks, healthy bakery and frozen novelties.

Oat bran-added

As consumers looked toward foods during 1989 for answers to their health concerns, sales of oat bran products soared. According to Arbitron/SAMI, sales of cold cereals with oat and bran added went from $69.7 million in 1988 to $240 million in 1989—an increase of 245.3 percent. In the hot cereal category, sales of oat and bran-added cereals went from $4.2 million in 1988 to $10.3 million in 1989—an increase of 142.2 percent. (A complete report on the oat bran cereal market is available from Arbitron/SAMI, 41 East 42nd Street, New York, NY 10017.)

The market for cereals that appeal to the health-conscious adult accounts

Top 10 food company introductions

	1988	1989
Philip Morris Co., Inc.,	67	156
Nestlé Holdings, Inc.	44	52
Campbell Soup Co.	47	51
Unilever United States, Inc.	38	47
RJR Nabisco, Inc.	50	46
Ralston Purina Co.	27	41
Borden, Inc.	26	39
General Mills, Inc.	53	38
Grandmet Consumer Products	–	32
ConAgra, Inc.	35	29

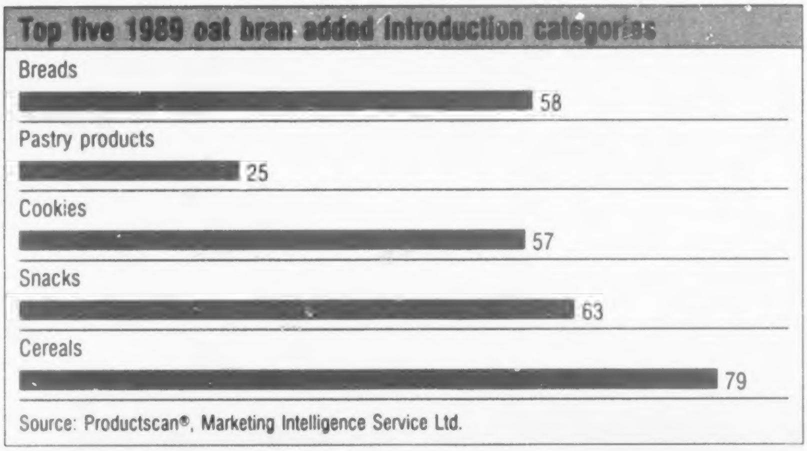
Source: Productscan®, Marketing Intelligence.

1989 beverage introductions

Food	Total intros.	New brand	Line ext. w/in brand	Other (i.e. new package)	Total SKUs
Alcohol beverage substitutes, low alcohol	11	6	–	5	25
Baby beverages	8	1	1	6	15
Beer & ale	57	25	–	32	86
Beverage mixes & bases	28	15	–	13	80
Cocktail mixes	10	4	1	5	19
Coffee	69	31	–	38	189
Fruit and fruit flavored	98	26	–	72	223
Health drinks	7	3	–	4	25
Isotonic, energy producing beverages	19	10	–	9	30
Liqueurs	5	3	–	2	6
Milk & non-dairy milk	25	8	–	17	40
Milk additives	1	1	–	1	1
Mineral water & bottled water	46	18	–	28	124
Miscellaneous soft drinks	64	64	–	39	256
Tea	41	13	1	27	146
Vegetable and vegetable flavored	11	1	–	10	1
Wine & wine coolers	27	10	–	17	69
Other alcohol	32	15	1	16	47
Total	559	214	4	341	1402

Source: Productscan®, Marketing Intelligence Service Ltd.

NEW PRODUCT ANALYSIS



Source: Productscan®, Marketing Intelligence Service Ltd.

BARBARA'S
OAT BRAN PRETZELS
CASA RICARDO
OAT BRAN
TORTILLA CHIPS
ALL NATURAL
Common Sense OAT BRAN
NEW
Eggo
Oat Bran
Fruit Jumbos Cookies
Health Valley

Oat bran seemed to be the magical ingredient of '89 with cereals, cookies, breads, snack foods, pasta, and beer among the foods it appeared in.

for nearly 20 percent of the $6 billion ready-to-eat cereal category and is growing, reported Nabisco Brands Inc. (East Hanover, NJ) when introducing *Nabisco Shredded Wheat with Oat Bran* in August. Another cereal producer to introduce a line extension by adding oat bran to an existing product was Ralston Purina Company (St. Louis, MO). *Oat Chex* bran cereal was advertised as combining the great taste of crunchy toasted oats with a touch of honey with the benefits of oat bran.

While cereals were the most common food product to which oat bran was added, they certainly were not the only ones. Cookies, breads and other bakery products, snack foods and pasta products also were formulated to include oat bran.

Pet Incorporated (St. Louis, MO) and Kellogg Company (Battle Creek, MI) both introduced frozen waffles with oat bran. Pet's *Downyflake* oat bran frozen waffles were introduced in major markets at the end of 1989, with national rollout scheduled for the first quarter of 1990. An oat bran variety was added to *Pillsbury Microwave Pancakes* from Pillsbury Company (Minneapolis, MN).

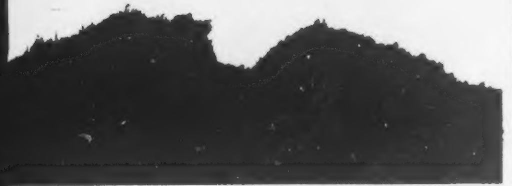
Schulze and Burch Biscuit Company (Chicago, IL) added an oat bran variety to its line of *Flavor Kist Toast'em Pastries*. Both blueberry and strawberry varieties are available.

An example of a new cookie containing oat bran is *Oat Bran Fruit Jumbos Cookies* from Health Valley Foods. They are made with organically grown whole wheat flour, oat bran, concentrated fruit juices and fruit, soy oil, oats, organically grown apricots, natural flavors, soy lecithin, and baking soda. Each cookie contains 2.3 grams of oat bran and 1.5 grams of dietary fiber. Packages carry the statement, "Recent nutritional research indicates that just 3-1/2 ounces of oat bran a day can lower cholesterol by as much as 30 percent in people with elevated cholesterol."

Another line of cookies with oat bran hails from LifeTone International (Boca Raton, FL). *LifeTone Oat Bran Cookies* are soft, homemade-style cookies and come in three varieties: carob date, cinnamon and vanilla date.

Casa Ricardo Tortilla Chips with oat bran carried the statement, "Research indicates that soluble fiber removes cholesterol from our bodies. Since oat bran has more soluble fiber than most grains, it has become our #1 natural means of reducing cholesterol!!!" The product is manufactured by Ricardo's Inc. (Memphis, TN).

Barbara's Oat Bran Pretzels, from Barbara's Bakery, Inc. (Petaluma, CA), are over 30 percent oat bran. Each one ounce serving contains nine grams of oat bran and three grams of dietary fiber.



NEW PRODUCT ANALYSIS

Health claims concerning oat bran's role in lowering cholesterol when consumed as part of a low fat, low cholesterol diet received much attention in 1989. A recently issued Federal Trade Commission staff report examined the ready-to-eat cereal market and the role of producer advertising and labeling in communicating the link between diet and health to the public. The report provided evidence that the use of these health claims resulted in more individuals eating cereal—especially high fiber cereals. Moreover, the report pointed out that these effects were most pronounced for groups that are not well reached by government and general information sources.

The FDA's revised proposed health claims ruling, issued in February 1990, is more restrictive than the earlier version proposed in August 1987. Withdrawing its 1987 health claims proposal, FDA said that it was too broadly written and that some manufacturers have taken advantage of the uncertainties created. Whether oat bran will continue to be considered a magical ingredient is not yet clear. Much research remains to be done on fiber's effect in lowering blood cholesterol levels (see p. 28).

Introduction of oat bran added products continues, though, with other types of bran-added foods being introduced. The first quarter of 1990 saw a number of new rice bran product on the market. For example, *Rice Bran Options*, from Ralston Purina, is now being offered as an alternative to *Oat Bran Options*.

'Healthy' Dairy

According to the Marketing Intelligence survey, 130 new dairy products positioned as "low fat," "low cholesterol," and/or "light/lite" were introduced in 1989—down from 170 introduced the year before. Breakdown: ice cream, 34; cup yogurt, 27; cheese, 24; frozen yogurt, 17; milk, 8; sour-cream substitutes, 7; butter/margarine blends, 5; "other," 8. These are new product lines only; were all flavors, varieties, packaging sizes and line extensions included, the ice-cream category alone would total more than 200.

Ice cream: According to *U.S. Industrial Outlook 1990* (U.S. Department of Commerce), the value of ice-cream and frozen-dessert shipments grew 3.4 percent last year but per-capita consumption of ice cream dropped 6 percent as more consumers switched to lower-fat frozen desserts, with per-capita consumption of sherbet soaring 8.3 percent and ice milk 6.8 percent. Most significant new product of 1989: *Sealtest Free* Nonfat Ice Cream in eight different flavors, introduced in October to New England markets by Kraft General Foods (KGF) and which might prompt a new FDA standard of identity for nonfat "ice cream." (As this story went to press mid-March, however, KGF changed the identity of the product to "non-fat frozen dessert" to comply with current standards of identity.) Sealtest Free contains cellulose gel (microcrystalline cellulose) as a texturizing/bulking agent, contains less than 100 calories per half-cup serving and is positioned as low-cal, fat-free and cholesterol-free.

Other creative "healthy" frozen desserts introduced last year included *Lite Fantastic*, the "first ice-cream substitute that contains no sugar, no fat and no cholesterol," sweetened with NutraSweet and incorporating a combination of bulking agents for the "creamy mouthfeel" of ice cream, from Anderson-Erickson Dairy Co. (Des Moines, IA); and *Rich n'Free* no-fat "ice cream" (manufacturer's quotation marks) which reportedly uses carmelized skim milk to achieve texture without bulking agents, contains 90 percent less cholesterol than real ice cream and only 60 calories per 3-oz. serving, from Nouvelle Ice Cream Co. (San Raphael, CA).

Cheese: Biggest problem in developing fat/cholesterol-reduced cheese products: Taste, said Cindy Clark, manager of dairy products for the Fleming Companies at the Wisconsin Milk Marketing Board's Industry Forum last October. Although she has seen some good Jacks, Mozzarella and Swiss that fall into the low cholesterol/light categories, "I have not tasted a really good Cheddar," Clark reported. "And this is being reflected at retail. Cheddar is not selling anywhere near its normal percentage of the light or low-cholesterol total."

Marketing Intelligence reflects the problem: Of the 41 reduced fat/cholesterol natural cheeses (of all varieties) introduced last year, only four were Cheddar. Fourteen were imported European varieties such as Gouda, Havarti, Fromage Blanc, and Swiss. American-made varieties were mostly Mozzarella, Jack and Colby. Most unique new line of '89: *Gamay Smart* no-fat cheese, from Gamay Foods, Inc. (Franklin, WI), in four varieties. Made of 100 percent skim milk, the Gamay products are positioned as no fat, no cholesterol, no additives, low sodium and with 75-percent fewer calories than regular cheese, yet bear the UDIA "Real" dairy seal. White Clover Dairy (Hollandtown, WI) introduced four varieties of reduced fat cheeses (Cheddar, Colby, Gouda, and semi-soft "Farmer") in several retail, foodservice and commercial sizes, with the Cheddar labeled "44 percent less fat than regular Cheddar cheese." Borden and Land O'Lakes unveiled low-fat Cottage cheese containing only one percent milk-fat.

Twenty-one additional reduced fat/cholesterol processed cheese products—mostly spreads—were introduced in '89. One, actually an imitation cheese, is vegetable-oil based *Nucoa Heart Beat American Sandwich Slices* from GFA Brands, Inc. KGF unveiled *Kraft Crockery Spreadable Cheese Snacks*, low in cholesterol and with "25 percent fewer calories than cream cheese."

Yogurt: According to the March, 1989 study *The Yogurt Market* by the New York market-research firm FIND/SVP, cup-yogurt sales grew at a compound annual growth rate of 9.2 percent from 1982-88 to reach a producer value of $1.05 bil-

Twenty-four new lowfat/low cholesterol/"light" cheese-product lines totaling 62 varieties were introduced in 1989. Several are shown above. (Source: Wisconsin Milk Marketing Board.)

[redacted]

lion in '88, and will continue growing at an annual rate of 5 to 8 percent to reach $1.13 billion by 1993. Spurred by the mid-'88 FDA clearance of NutraSweet in yogurt products, nonfat yogurts accounted for 11 percent of all yogurt sold by early '89, FIND/SVP esimated.

According to Marketing Intelligence, 27 more lowfat/nonfat yogurt lines were introduced in 1989. Counting all brands, flavors and package sizes, the segment exploded with 108 new items last year. Major processors niched the segment with multiple product lines, offering varying cup sizes for varying calorie counts per serving, various single and multiple-fruit flavors, varying pack sizes (e.g. four-packs and six-packs, some with varying flavors per pack), mostly sweetened with NutraSweet. Borden, Kraft General Foods, Yoplait USA and Dannon each launched three new lowfat/nonfat yogurt lines last year; Weight Watchers International two.

Frozen yogurt: According to a Sept. 1989 study by FIND/SVP, retail sales of frozen yogurt soared 516 percent from $200 million in 1985 to $1.2 billion in 1989 for a compound annual growth rate of 57.6 percent, and sales will more than double to $2.6 billion by 1993 with new flavors and novelties sparking the trend. Marketing Intelligence lists 12 bulk-packed frozen-yogurt products introduced in 1989. (See page 84 for frozen-yogurt novelties.) Examples: *Hood Frozen Yogurt* in five flavors, 97-percent fat-free and low in cholesterol, from H. P Hood (Boston); *Purity Frozen Yogurt*, 98-percent fat-free with 105 calories per 4-oz. serving, from Purity Dairies (Nashville, TN). The only NutraSweet-sweetened frozen yogurt to date is NutraSweet's own *Desserve*, introduced in November 1988 and marketed to food-service operators by Elgin-Honey Hill Corp. (Chicago).

Other products: Lowfat sour-cream items included both real-dairy and substitute products. Examples: *Daisylight Light Sour Cream* from Daisy Brand, Inc. with 40-percent less fat and 25-percent fewer calories than sour cream; *King Cholesterol Free Sour Cream Alternative* made with 100-percent corn oil for no cholesterol with 30-percent fewer calories from American Whipped Products, (Newburgh, NY).

Reduced-calorie spreads included *Pure and Simple Light Butter*, "the world's first 'light' butter" with "46 percent less cholesterol than regular butter," introduced in Canada by Ault Foods; and Lever Brothers' *Dairybrook Reduced Calorie Butter Product*, made from butter and skim milk but with 50 percent less fat, cholesterol and calories than butter.

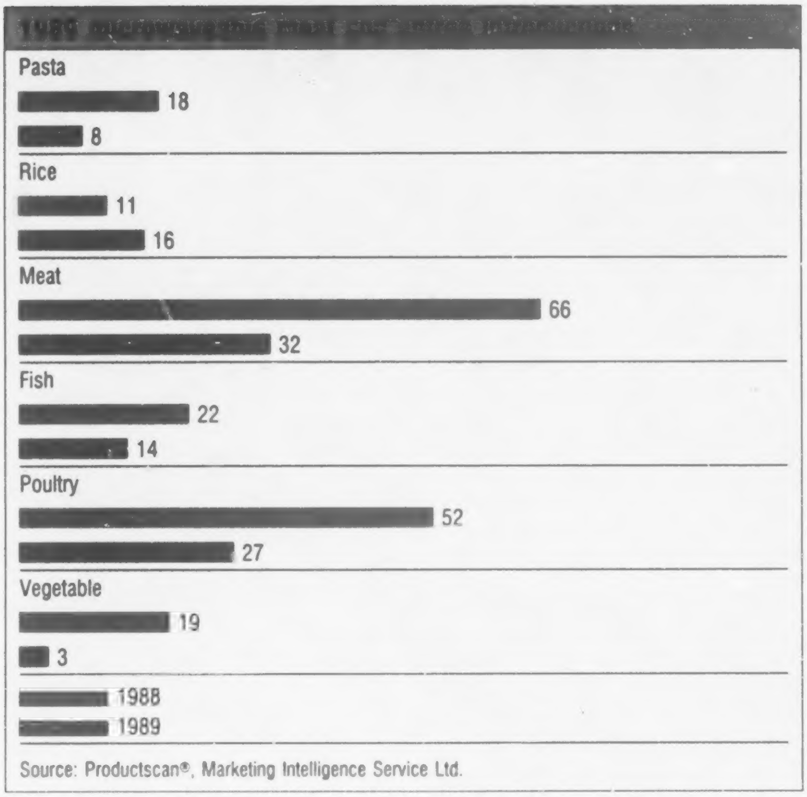
Microwaveable meals

Microwave ovens are now in 75 percent of U.S. homes, with 90 percent penetration expected by the year 2000, pointed out Patrice L. Custis, marketing research manager for the Campbell Microwave Institute (Camden, NJ). And one-third of U.S households use the microwave oven as the primary source of cooking.

"During consumer interviews, we learned that many Americans have embraced their microwave ovens with a passion—some even consider it a friend," Custis told those attending *Microwaves in the 90's*, a conference sponsored by the New York section of the Institute of Food Technologists, held February 20 in Woodbridge, NJ. "Clearly the microwave oven is here to stay."

Custis pointed out that $4 billion of prepared foods are heated in microwave ovens each year, and $1 billion of microwave-only foods were sold in

NEW PRODUCT ANALYSIS



Source: Productscan®, Marketing Intelligence Service Ltd.

1989 — a 50 percent increase from the previous year. "But microwave food product development lags penetration, creating extraordinary opportunities," emphasized Custis.

Several categories within microwavable meals were especially active during 1989.

Shelf-stable: A small, but growing area of microwaveable meals is shelf-stable. With freezer space at a premium, these products have appeal to supermarkets. And, they offer a greater degree of portability to consumers. According to Find/SVP (New York), shelf-stable foods have the potential to take away 10 percent of frozen food sales. Among the products introduced in this area during 1989 were *Ole' Microwaveable Mexican Meals in Minutes* from La Mexicana Foods (Dallas, TX). They come in plastic dishes with foil tops and have a suggested retail price from $1.59 to $4.99. Beef Fajitas with Texas Mesquite Flavor, Smoked Flavor Chicken Fajitas, Chili Conqueso and Spanish Rice are some of the items in the seven-item line. Doubletree Foods (Phoenix, AZ) added two pasta items to its *Lunch Bucket line* — Fettucine Marinara and Pasta Italiano. Both have a suggested retail price of $1.29.

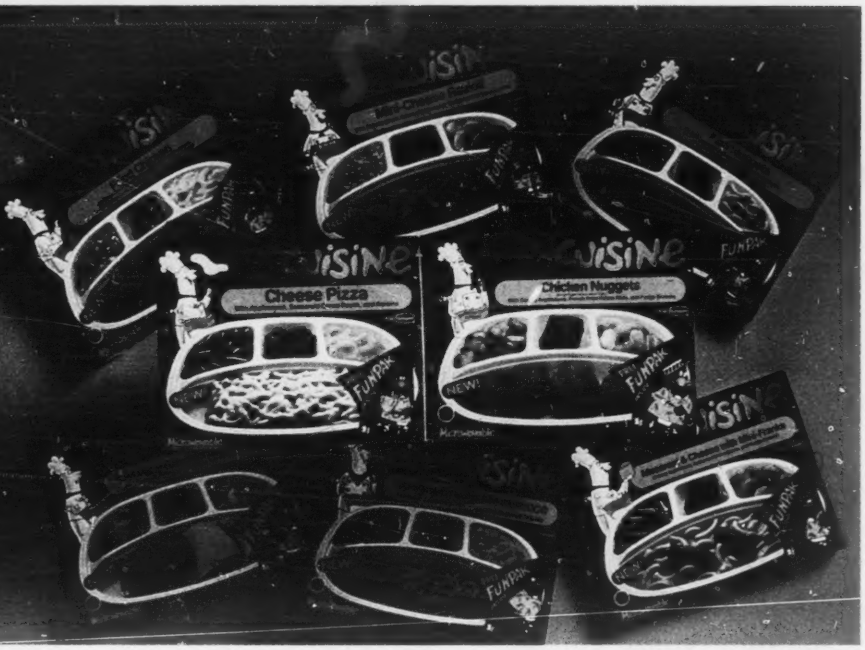
Another line extension to single-serve, shelf-stable products during 1989 came from Geo. A. Hormel & Co. (Austin, MN) — *Lasagna* and *Spaghetti and Meatballs* in 7-1/2 oz. tubs containers which retail for $1.05 each.

Kraft General Foods (White Plains, NY) announced the introduction of *Kraft Impromptu Lite* shelf-stable entrees. Seven varieties, each under 200 calories, are in the line. They are packaged in plastic trays. Also from Kraft General Foods are *Minute Microwave Dishes*. Each comes in a microwavable dish and is prepared by adding water and heating.

Heat and run: The importance of convenience to consumers is particularly apparent in the sales of microwave sandwiches. In 1989, sales of microwaveable sandwiches (not including breakfast sandwiches) were $245.4 million as compared to $154.7 million for 1988 — a 58.6 percent increase, reports Alan Miller of Arbitron/SAMI. Breakfast sandwich sales have stabilized at about $100 million per year, said Miller.

Among the microwaveable sandwiches introduced in 1989 are: *Micro Manwich Sloppy Joe Sandwiches* from Beatrice/Hunt-Wesson, Inc. (Fullerton, CA); *Great Grillin's Microwave Burgers* from Quaker Oats Company; *Pizza Pockets* from Lamb-Weston, Inc. (Portland, OR); *Esskay Microwavable Hamburgers* and *Cheeseburgers* from Schluderberg, Kurdle Co., Inc, (Baltimore, MD); *Act II Pizza Pockets* from Golden Valley Microwave Foods (Edina, MN); *Lean Pockets Singles* from Chef America (Chatsworth, CA); and *Barbecue Chicken Sandwich* from Tyson Foods, Inc. (Springdale, AR). In addition J.R. Simplot Company (Boise, ID), one of the early players in this category, introduced 3-packs of its *MicroMagic Microwave Cheeseburgers, Ham-*

NEW PRODUCT ANALYSIS



With convenience the price of entry for any new product, the number of new foods developed for microwave preparation is expanding rapidly.

burgers and *Chicken Sandwich* during 1989. The larger size was added after research showed that consumers purchased an average of 3.2 MicroMagic sandwiches per transaction.

Also in the heat and run category, 1989 saw the introduction of a number of frozen, microwaveable hors d'oeuvres. *Shang Hai Shrimp Eggrolls* from Lee Foods Corp. (Syracuse, NY) were introduced in a two-count seven ounce box. Lo-An Delicacies (Tampa, FL) also introduced eggrolls. *Cha-Zah! Large Vegetable Egg Rolls* come four to a box with a suggested retail price of $1.69.

Healthy: A new category within microwavable meals/entrees in 1989 encompassed those products formulated to meet the latest dietary guidelines with controlled levels of cholesterol, fat and sodium. ConAgra Consumer Frozen Food Co. (Omaha, NE) began the year by launching *Healthy Choice* frozen dinners. This line has become a $100 million brand and was the number three frozen dinner brand during the last 12 weeks of 1989, reports Miller. The success of the Healthy Choice frozen dinners led to the introduction of *Healthy Choice* frozen entrees during the fourth quarter of 1989.

Stouffer Foods (Solon, OH) rolled out *Right Course* frozen entrees in September 1989. The line contains 11 items including shrimp primavera, chicken tenderloins in peanut sauce, vegetarian chili and beef dijon with pasta & vegetables.

Meals for Kids: With more mothers working, younger children are now in the kitchen. A number of frozen meals introduced during 1989 were geared specifically toward children. Following a successful test market in Dallas, Denver, St. Louis, Salt Lake City, Indianapolis and Fort Wayne, IN, *Kid Cuisine* frozen dinners were rolled out nationally in the fall of 1989. The eight-item line carries the Banquet brand (ConAgra) and was developed to meet kids' preferences for tastes.

Geo. A. Hormel & Co. introduced a shelf-stable line of microwaveable meals for children during 1989—*Kid's Kitchen*.

The challenge within the microwaveable meal category will be to keep up with the latest technology without loosing sight of the consumer, concluded Campbell's Custis.

'Healthy bakery'

Consumer nutrition concerns created an avalanche of "healthy" bakery products last year. According to Marketing Intelligence, no less than 202 new "healthy bakery" products in 418 varieties were introduced in 1989. Breakdown: bread, 39; buns/rolls/ muffins, 20; pastries, 37; mixes, 17; crackers/crispbread/croutons, 42; cookies, 31; snack bars, 16.

Bakers were originally slow to board the bran bandwagon: Only 16 new bakery offerings in 1987 and 18 in '88 were positioned as high-fiber products. That pace accelerated at space-shuttle speed last year as 113 new products were tagged as "high fiber" or "high in bran." Most incorporate oat bran but a few bakers were quick to exploit rice bran, also shown recently to be effective in reducing cholesterol (*FE* Nov. '89). Examples: rice-bran breads from Inter-American

Foods (*Monks*, *Natural Grain*) Campbell Taggart (*Roman Meal*) and Stroehmann Bakeries (*Bohemian Hearth*); rice-bran cookies and crackers from J&J Snack Foods; rice-bran graham crackers, fruit bars and fruit muffins from Health Valley Foods.

But bakers were quick to renounce tropical oils: Led by Procter & Gamble, Pepperidge Farm, Keebler Co. and Ralston Purina (as well as by Kellogg, Quaker Oats, and General Mills), many bakers reformulated their products to eliminate palm and coconut oils, which are high in saturated fatty acids. Yet according to Marketing Intelligence, only 15 bakery products or product lines introduced last year were specially labeled "no tropical oils."

"Light" (or "lite") breads all containing 40 calories per slice were introduced in several varieties by a host of bakers including Charles Freihofer, Continental, Interstate, Matthew's All Natural, Stroehmann, Schwebel, Arnold, Metz, Weight Watchers, Butter-Krust, and Taystee. Several offer light oat-bran varieties. Pepperidge Farm is different: It's new *Light Style* breads have 45 calories per slice. Light hot-dog and hamburger buns were launched by Freihofer and Stroehmann.

Oat bran abounds on the bakery rack and in the frozen-bakery case: Campbell Taggart introduced *Rainbo* oat-bran hamburger buns; S.B. Thomas, Sara Lee, Campbell-Taggart, Merico and General Foods (*Orowheat*) oat-bran English muffins; Lender's (Kraft), Sara Lee and Mrs. Fields oat-bran bagels; Athens Pastries, Tofuyans's Bakeries and M.E.B., Inc. oat-bran pita bread; Healthy Munchies oat-bran breadsticks; New England Food Co. oat-bran pouch bread; Lifetone International oat-bran toast. Major players introducing oat-bran muffin mixes included Proctor & Gamble (*Duncan Hines*), General Mills (*Betty Crocker*), Fearn Natural Foods and Martha White.

"Healthy" pastry introductions included a line of *Entenmann's* (General Foods) fresh cholesterol-free cakes, cookies and muffins, all labeled "less than 100 calories per serving." Most unique item in the line: A cheese-filled crumb coffee cake stickered "made with fat-free cheese." Continental Baking Co. launched 97-percent fat-free *Hostess Lights* chocolate snack cakes in four varieties made with 100-percent vegetable oil and with 110 to 140 calories per cake, depending on variety. Pepperidge Farm introduced *Dessert Light* in five single-serve varieties with less than 175 calories per 2¾- to 4½-oz. serving. Two bakers introduced cholesterol-free "cheesecakes:" *Lindy's No Cholesterol Cheesecake* from Lindy's Food Products (New York City) is made with "a cream cheese alternative;" *Eli's Light Cheesecake* from Eli's Chicago's Finest is made with soy proteins, low-fat dairy products and no eggs for 69 calories per ounce.

Bakers have learned to be cautious when labeling their products "light." Although the term has yet to be defined by FDA, Sara Lee last year was forced by the attorneys general of nine states to drop the term from labeling on a four-item line of whipped desserts. Sara Lee said "light" described product texture; the states claimed that consumers interpret "light" to mean low in calories.

Low Salt
wheat thins
Oat Bran
WONDER
LIGHT

"Healthy bakery" product introductions in 1989 included a number of "light" breads with 40 calories per slice, and crackers positioned as cholesterol-free, low in sodium or high in fiber.

NEW PRODUCT ANALYSIS

Sparkling waters and an assortment of exotic-flavored beverages make up the choices offered by "New Age" drinks.

New Age Drinks

Does Perrier have a chance to bounce back from its brush with benzene contamination? Industry observers seem to think the import giant will make a comeback but will lose its dominance of imports in the U.S. bottled water market.

The longer the brand stays off grocery shelves, the tougher the uphill battle will be to take back space taken over by regional brands such as San Pellegrino and Saratoga. "My best bet is that Perrier will recover no more than 60 percent of what it lost," said Mona Doyle of Consumer Network (Philadelphia).

"Everyone in the industry who I spoke to expressed sympathy for Perrier and felt they handled it well," said Helen Berry, research director of the Beverage Marketing Corp. (New York). To recover its niche in the $28.8 million sparkling mineral water market (Arbitron/SAMI, New York), industry observers agree that Perrier will have to mount a massive media blitz to woo consumers back from other brands. In March, Perrier began to advertise its return.

Close on the heels of Perrier is Evian, which is the fastest growing bottled water in the $1.8 billion dollar market according to Berry. Total volume in the bottled water category has multiplied four times during the last decade which accounts for the more than 600 brands in the U.S., reported the International Bottled Water Association (Alexandria, VA).

Since America is gulping down bottled water in record numbers (per capita consumption doubled in five years to 6.4 gallons), Adolph Coors Co. (Golden, CO) began testing the waters in mid-January with its *Coors Rocky Mountain Sparkling Water*. Pepsi-Cola Company announced from its Somers, NY facility the launch of *H2Oh!* sparkling water. While sales for the flavored sparkling water market have percolated to just over $29 million in 1989, according to Arbitron/SAMI, the juice-added sparkling water segment has virtually exploded with sales of $96.5 million in 1989, an increase of almost one-third over 1988. While bottlers find it pays to add juice to water, the opposite is true for soft drinks. Early in '89, Pepsi-Cola found the juice-added craze lost its fizz and reduced the juice content of its regular *Slice* soft drink from 10 to two percent. The diet version contains five percent juice down from ten.

Imports continue to be popular with many brands surfacing from Australia, such as *Koala Springs Sparkling Water, Aussie Mineral Water Fruit Beverage,* and *Walkabout Springs Mineral Water*.

No discussion of "New Age" drinks would be complete without mentioning the West Coast. Many of the sparkling waters and some exotic flavored beverages included Mexican-spiced drinks such as Cocodrilo Beverage, Inc. (Fountain Valley, CA) in Spicy Cola and Spiced Mango varieties that include a pinch of jalapeño and serrano essence. Wisdom Import Sales Co. (Irvine, CA) imports a tamarind-flavored beverage from Mexico. And on the health front, Mendocino Beverage Co. (Mendocino, CA) has won a recommendation by the California Health Research Foundation for its calcium level.

NEW PRODUCT ANALYSIS

SNICKERS
Ice Cream Bars
FROZFRUIT
FRUIT YOGURT
Crystal Light
CandyTops
Nestle
Rondos
Cool'n Creamy
ORANGE VANILLA
New!
Milky Way
Ice Cream Bars
6 BARS

Ice-cream "candy bars" and "bon-bons," aimed at the premium end of the market, and frozen stick yogurts and ice milks targeted to the low-cal end, were among the most unique frozen-novelty introductions last year.

Frozen Novelties

According to a January 1990 study by FIND/SVP, frozen novelties enjoyed astounding growth during the past decade, with retail sales soaring from $725 million in 1980 to $2.5 billion in 1989 and continuing to grow at an annual rate of 7.5 percent to $3.35 billion in 1993. Ice-cream and ice-milk products accounted for 49 percent of frozen-novelty sales in 1989, FIND/SVP reports. Water-ice products contributed 25 percent, fruit bars 14 percent. Pudding pops, tofu, sherbet and "other" types (mainly gelatin and yogurt) each generated about 3 percent. The "other" category, however, is growing at an annual rate of 25 percent, mainly because of frozen yogurt. FIND/SVP sees future growth dominated by two opposing types: "high-calorie/high-gratification" treats such as *Häagen-Dazs* bars and *Chipwiches*, and "low-calorie/low-cholesterol" types such as sugar-free *Eskimo Pies* and *Crystal Light* frozen-drink bars. Reason: The frozen-novelties market is becoming increasingly adult-oriented as the "traditional" children's segment stagnates. "Superpremium products are more important to this market than ever before," FIND/SVP concludes. Niche marketing and strong brand identity is essential in a market where product life rarely exceeds 3 years.

According to Marketing Intelligence, 75 new frozen-novelty lines and line extensions totaling 144 products were introduced in '89. Gold Bond, which owns Popsicle Industries, was most active with no less than 14 new-product launches totaling 25 items. General Foods was next with five new-product introductions totaling nine items. Most unique at the "high-calorie/ gratification" end are the stickless "ice-cream candy bars" and "bon-bons" unveiled by Dove International division of Mars, Inc., Nestle and Carnation Co. (a subsidiary of Nestle). Dove, first with an ice-cream candy bar by extending the Mars' *Three Musketeers* brand in 1988, added six-packs of Mars' popular *Snickers* and *Milky Way* brands this year. Nestle launched *CandyTops*, a four-pack assortment of Nestle-brand candy bars including *Oh Henry* and *Nestle Crunch*. Dove introduced several varieties of *Rondo Bite Size* bon-bons in 15-count dispenser cartons; Carnation reintroduced two varieties of *Bon Bons Ice Cream Nuggets*. Gold Bond introduced *Bon a'Petites* bite-size frozen *Creamsicle* and *Fudgsicle* ice-cream/sherbet bon-bons.

Most unique new products at the low-calorie/low-cholesterol end are frozen-yogurt stick bars incorporating fruit particulates such as *Frozfruit* from Frozfruit Corp. (Gardena, CA), *Dole Fruit 'N Yogurt Bars* and *Dannon Frozen Lowfat Yogurt On a Stick* (Gold Bond), now in chocolate-coated fruit flavors. Dove entered the low-cal end with a *Dove Light* ice-milk bar. General Foods aimed at the low-cal end with two varieties of fruit-juice bars—*Jell-O Citrus Snowburst* in two flavors and a "Merry Berry Pak" of *Kool-Aid Kool Pops*, plus *Jell-O Gelatin Pops* in three flavors—but didn't neglect the premium side by introducing two varieties of *Baker's Fudge-tastics Ice Cream Sundaes On-A-Stick*. Gold Bond aimed at the children's market with six new ice-cream sandwiches embossed with *Nintendo* video-game characters. Continental Baking Co. entered the frozen-novelty market with *Hostess Twinkies Ice Cream Splits*.

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MAY 1990

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E-SHOW REPORT

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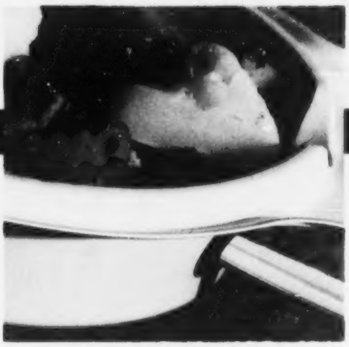
PLUGGING INTO VALUE-ADDED PACKAGING

FOOD ENGINEERING



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Food products that can be prepared in a matter of minutes are what consumers want. And, value-added packaging gives consumers the convenience they crave.

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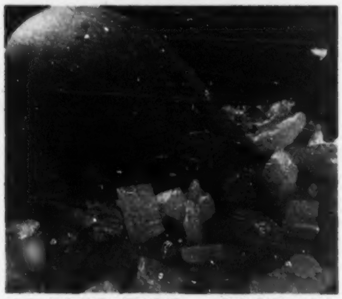

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Almost 7,000 new brands invade store shelves

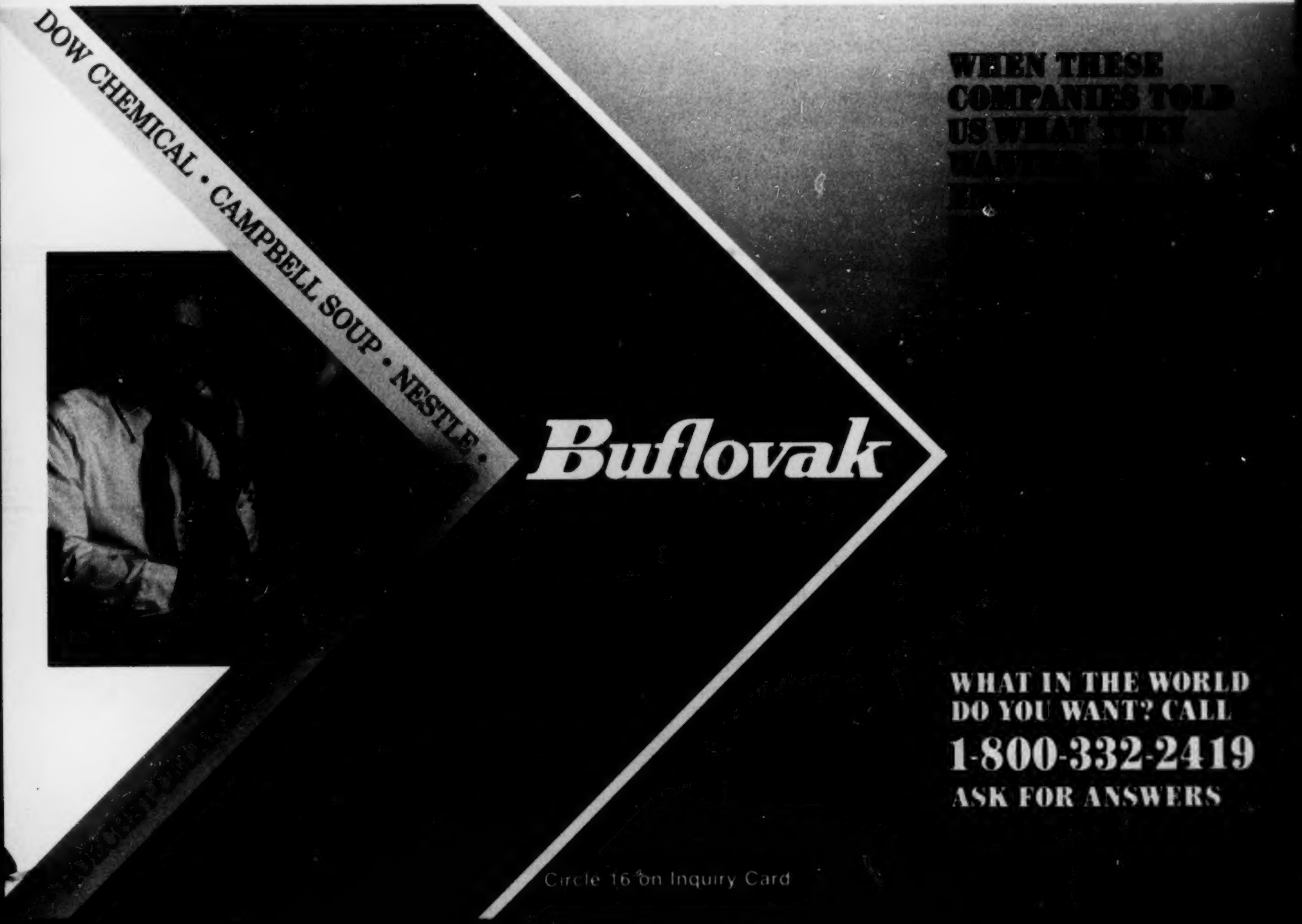
Approximately 6,960 new brands have been introduced to grocery store shelves during the past two years, reported a recent Arbitron/SAMI, (New York) study. However only 3.5 percent or 240 of them blossomed into million dollar earners by early November 1989.

Apple Cinnamon Cheerios showed the highest dollar volume with more than $92 billion. Debutante brands broke down as: 3,900 in dry grocery; 700 frozen; 785 refrigerated; 925 health/beauty aids and 650 non-food.

More than half of the 6,960 new brand introductions were in the dry grocery category. (Source: Arbitron/SAMI.)

MIF/IICA plays cool to DFISA offer

The Milk Industry Foundation (MIF) and the International Ice Cream Association (IICA) are playing it cool to the Dairy and Food Industries Supply Association (DFISA) offer to jointly sponsor DFISA's biennial Expo. Although DFISA has offered greater cash compensation (see FE, April '90) to MIF/IICA, sources say MIF/IICA is seeking a greater voice in the management of the Expo.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First rDNA food product cleared

In response to a Feb., 1988 petition by Pfizer, FDA on March 23 affirmed that chymosin dervived from fermentation of a nontoxic strain of *E. coli* K-12 genetically engineered to contain the prochymosin gene is Generally Recognized As Safe (GRAS). Pfizer's chymosin is thus the first food product developed through recombinant DNA technology to be cleared for direct food use. The product is GRAS as an enzyme, processing aid, stabilizer and thickener in cheese, frozen dairy desserts and mixes, gelatins, puddings, fillings and milk products, said FDA.

Clearance of this petition obviates a Pfizer food-additive petition (filed at the same time as the GRAS-affirmation petition) to clear the genetically-modified organism as a source of prochymosin for use in food. FDA concluded that "the chymosin enzyme in chymosin preparation is the same as the chymosin enzyme in calf rennet" and "is as safe as the chymosin enzyme in rennet."

FDA's action seems to pave the way for further clearances of Gist-Brocades' and Genencor's chymosins developed via rDNA.

Pfizer Chemical Division, 235 East 42nd Street, New York, NY 10017

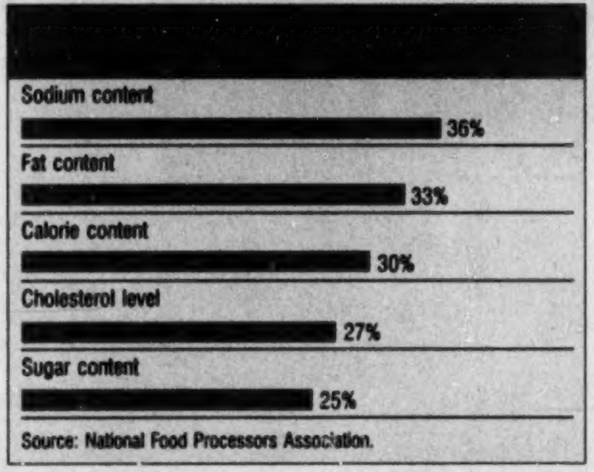
Circle 207

MARKETPLACE

Consumers prefer simple food label with numerical comparisons

When given a variety of food label formats to select from, consumers preferred a simple version that contained information on fiber, saturated and unsaturated fats, sodium and cholesterol. This was among the findings of the recently completed food labeling study sponsored by The National Food Processors Association (NFPA). The study—***Food Labeling and Nutrition: What Americans Want***—was conducted in two phases by Opinion Research Corporation, Princeton, NJ, and involved more than 1,400 consumers.

Label format preference was determined in the second phase of the study where consumers were asked to rank six label formats according to their helpfulness in making decisions about food purchases. A factorial design was utilized where each respondent saw no more than four of the six possible label formats. The formats were: #1: Control; current label. #2: Current label with full information on carbohydrates (complex vs. simple sugars versus fibers) and fats (saturated versus unsaturated). #3: Format #2 plus information on percentage of calories from protein, saturated and unsaturated fat, complex carbohydrates and simple sugars. #4: Same information as Format #3, with percentage of calories for key nutrients presented as a pie chart. #5: Format #2 plus a nutritional profile stating recommended daily allowance for calories, total fat, saturated fat, cholesterol and sodium. #6: Same information as Format #5, with daily recommendations presented as a bar graph.



Source: National Food Processors Association.

Each of the six label formats was tested with each of six products: breakfast cereal, tomato soup, 2% lowfat milk, chocolate chip cookies, macaroni and cheese and enriched white bread.

Consumers expressed a clear preference for Label #5, according to the study. The preference shown was consistent with the desire for additional information on key nutrients, and more information on RDAs noted in phase one. Label #1, which provides the least information, was rated as very helpful by the fewest number.

Consumers also indicated a slight preference for seeing sugars grouped rather than shown in their current format. Copies of the report are available from NFPA's Donna Smith at 202/639-5934.

Circle 20 or see FEM, p. 261→

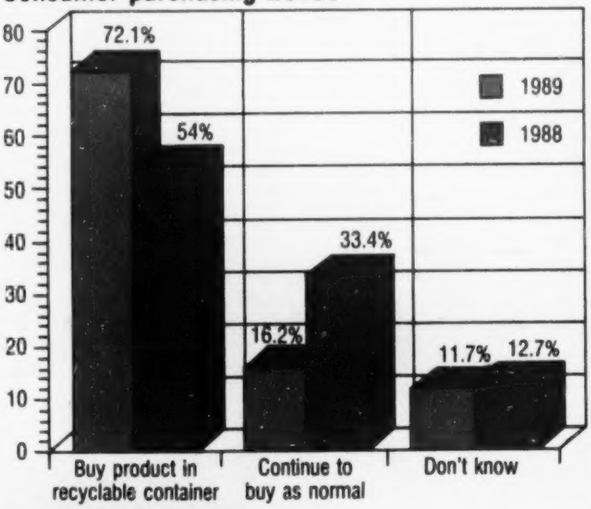
Poll reveals that Americans prefer recyclable containers

According to a nationwide poll conducted for the glass container industry, an overwhelming number of American consumers – 72 percent – would purchase food or beverages in containers that are recyclable over non-recyclable containers. This represents an 18 percent increase from 1988 according to the poll conducted by the Gallup Organization for the Glass Packaging Institute (GPI).

When consumers were asked if they would continue to buy a product packaged in a non-recyclable container, only 16 percent responded that they would continue to buy that product in that package.

The poll also revealed that nearly 50 percent of those polled said that their first choice of how to help solve the solid waste crisis is curbside pickup. This option was selected over returning recyclable materials to recycling centers or taking deposit containers back to stores for redemption. This represents a 23 percent increase from a similar poll conducted in 1989. The GPI-sponsored poll on recycling attitudes also showed a nearly uniform response in every region of the nation on the question of use of recyclable packaging and separation of refuse for curbside pickup.

Consumer purchasing trends



Source: The Gallup Organization, Inc.

[illegible] Glass Packaging In[illegible] Source: The Gallup Or[illegible]

"The ongoing movement by the American consumer towards a recyclable food and beverage packaging environment is reflected by the numbers in this poll," said Lewis D. Andrews, Jr., President of the Glass Packaging Institute. "Not only do Americans want to buy their food and drinks in recyclable packages, but they also are more than ready to separate glass, cans and paper for pick-up at curbside," said Andrews.

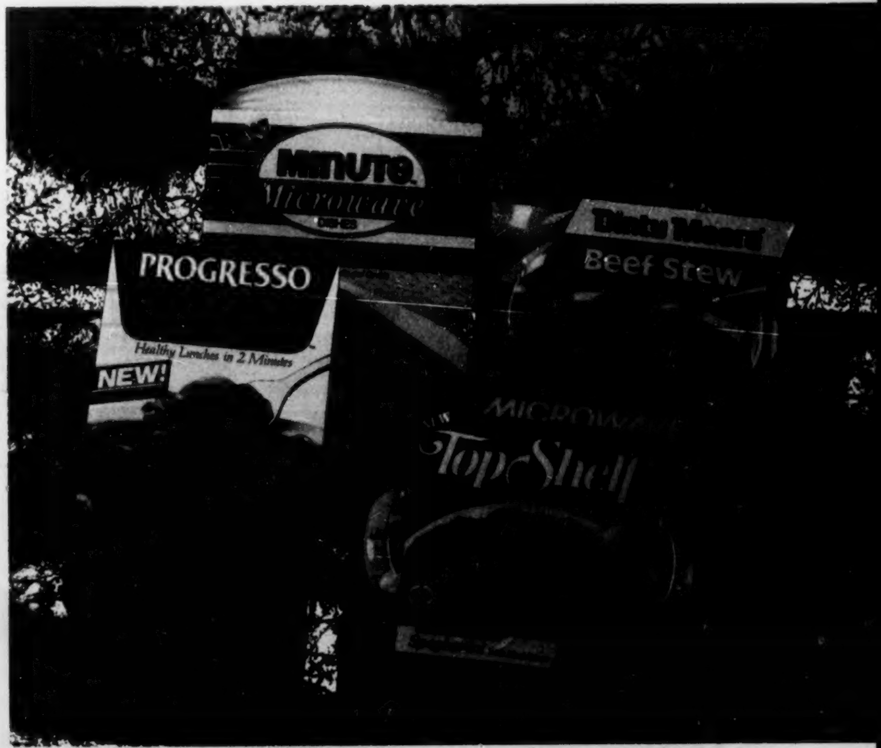
For more information on this study contact the Glass Packaging Institute, 1801 K Street, N.W., Suite 1105-L, Washington, DC 20006.

The solid waste reduction and energy-saving benefits of steel recycling and the growth of steel can recycling were the primary issues of focus of The American Iron and Steel Institute's (AISI) Committee of Tin Mill Products Producers (CTMPP) participation at the 1990 Food Exposition about Science and Technology (FEAST) Show.

During its "Steel Trek" programs at the show, the AISI promoted the industry's position as the Number One recycler in America. Steelmakers want to help the food industry understand not only steel recycling's environmental and ecological benefits, but also the economic advancements of the steel can. These combined features will help food processors and packers build on the traditional quality and performance of the steel package to meet today's consumer needs.

William Heenan, board chairman of the Steel Can Recycling Institute (SCRI) and general manager of Tin Mill Products at USX Corporation, said that the industry has generated momentum on the recycling issue over the past few years. He also said the steel industry is the single largest recycler in America and consumes twice the amount of recycled material than all other industries – double that of paper, non-ferrous metals (aluminum, copper), glass and plastics combines. The result is decreased pressure on the dwindling landfill space and environmentally compatible material.

The American Iron and Steel Institutes's Committee of Tin Mill Products Producers is comprised of eight major North American Steel producers including Bethlehem Steel Corporation, Dofasco Inc., LTV Steel Company, National Steel Corporation, Stelco Inc., USS, a division of USX, Weirton Steel Corporation, and Wheeling-Pittsburgh Steel. ▲



GOT A NEW PRODUCT? GET A NEW PACKAGE!

Any new product introduction is always joined by a new and demanding package design. Are the packages meeting these demands? You bet they are!

MARGIE J. RUSSELL
TECHNICAL EDITOR

We are all familiar with the scenario: You've worked all day, it is now 5:30 p.m. and you are hungry for a decent meal. And that meal must be nutritious, good-tasting, and most of all easy to prepare. What do you do now?

Thanks to demands like yours and millions of other average consumers, food companies have solved the problem. Some of these products may already be in your home and in your local store which you can quickly pick up on the way home. Without a doubt, food packaging has answered the call for products that can be prepared in a matter of minutes.

The push for convenience packaging continues as product development in the industry still focuses on products that can be heated in the microwave in a matter of minutes.

"Without question, the premise of the food industry is changing and consumers are likewise changing," says Dr. Melvin L. Druin, Vice President, Packaging Systems, Campbell Soup Company, Camden, NJ. "Today, in terms of convenience and new packaging designs, everything is added value in the package. We need to quantify what convenience is and what the consumer is willing to pay based on value. And, when new products are introduced, some food formulations have to be changed and different processing techniques must be dealt with. Almost always, processors and packagers look to minimize risks; let's face it, you cannot make a lot of mistakes in this marketplace. Any new major product introduction costs mega bucks and if there are functional attributes added to a package, this all adds up to cost value."

Zap that container

The original minute meal and convenience food was developed around the microwave oven. Microwave packaging is convenience packaging. In general, the container must be microwaveable, easy to open, lightweight, unbreakable, portable, recloseable, and have "handleability": pop it in the microwave and it is done.

Market analysts forecast that prepared entrees will remain the largest growth area in the retort/ microwaveable segment. (See chart.) However, the growth of this segment is somewhat limited because many of these products are substitution products and container sizes and line speeds prohibit further expansions at this time.

Specifically, shelf stable prepared entrees include both tub and tray configurations. But, the industry does make distinctions between the two types of entrees. Entrees in tub configurations are substitution products – they are microwaveable meals without the metal can. Shelf stable entrees in tray configurations are usually considered upscale meals or upscale sidedishes. These entrees are substitution products for frozen food entrees and normally do not provide the added value seen in tub products.

"When you look back at the last two decades of the industry, the word "convenient" took on different meanings," explains Campbell's Dr. Druin. "Back in the 1950s, for example, the four-compartment tray contained a complete entree, was placed in a conventional oven for 30-35 minutes, and this was convenient. Now we have meals where preparation time is a minute or two in a microwave. Our own Microwave Institute has estimated that more than 85 percent of the workplaces in the United States now have microwaves and at least 80 percent of the employees are using the microwave at work at least once per week. This definitely gives a new meaning to convenience."

Companies may decide on a new product introduction for a new line, substitution or extension but they must be concerned with safety and stability in their retort/microwaveable products. And, from a retail standpoint, they must market that product effectively.

A new product that just entered test markets in Baltimore, Washington, DC, St. Louis, and Seattle is Pet Incorporated's *Progresso To: Go*, a line of shelf stable microwaveable meals. This line is targeted for the office crowd and was primarily developed for taking the meal to work.

Carnation Company has captured the bulk of the fresh pasta market with a product that maintains a 45-day refrigerated shelf life due to the advances in modified atmosphere packaging techniques.

Progresso To: Go is available in six varieties: glazed white meat chicken in sauce with vegetable rice medley, savory turkey with vegetables, spaghetti with meat sauce, pasta salad vinaigrette, pasta primavera with red sauce, and cheese tortellini salad. The company is marketing the product as a "healthy" meal – low calorie, low fat, and low cholesterol – and as an alternative to other shelf stable meals.

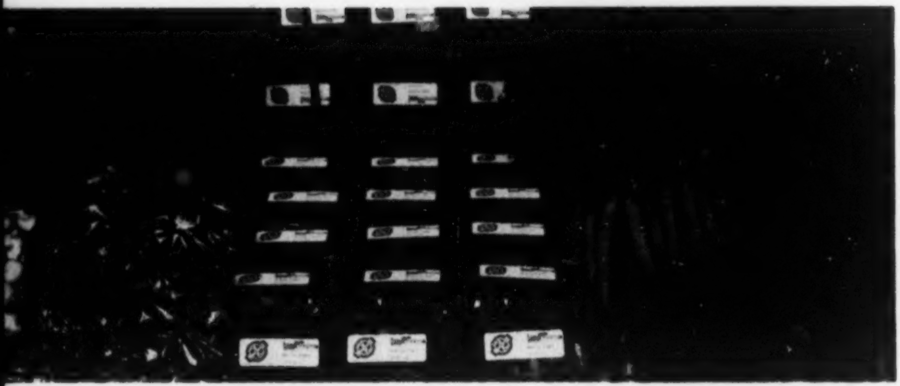
The product is packaged in a high barrier polypropylene/EVOH tray manufactured by Rampart Packaging (Williamsburg, VA). The production of the Progresso To: Go container by Rampart represents a new application for the company as it continues development of the low acid market. The tray is designed to withstand retort conditions. The foil membrane on the tray is heat sealed. Other features about the container are proprietary.

Hold those vegetables

If the thought of keeping fresh broccoli or cauliflower in your refrigerator in a fresh, just-packaged condition for several days before use interests you, then stay tuned for the current chapter in controlled atmosphere packaging (CAP). CAP is usually used as a preservation method for those food products which continue to respire after being picked, such as fresh fruits and vegetables. Under average conditions when using CAP methods, all packaging materials must match the respiration characteristics of the product.

The goal of controlled atmosphere packaging is to extend shelf life by reducing the product's respiration rate; this has been executed by Hercules Inc.'s (Wilmington, DE) *FreshHold* package. FreshHold is the only CAP for produce currently on the retail market; the first packer using the system is Fresh Western Marketing, Inc. in Salinas, CA.

The FreshHold system uses no gas



The FreshHold system extends the shelf life of fresh broccoli and cauliflower by 50 to 200 percent. (Source: Hercules, Inc.)

mixtures in the package. (See *FE* Oct. '89.) Instead, the system uses an impermeable container and an active (breathable) membrane label. This label is tailored to the product's respiration and can be adjusted by a proprietary process.

The FreshHold package appeared in retail stores in early fall 1989. The verdict from the retail side is now in; observers believe the package will change consumers' outlook on convenience.

"The FreshHold system really works—it absolutely does," says Richard Spezzano, Vice President, Produce, The Vons Companies Inc., Santa Fe Springs, CA. "Right now, my stores are carrying both the broccoli and cauliflower florets packaged in FreshHold. It increases shelf life two times or better. This definitely helps us [the retailer] because sometimes an entire day is lost on produce because of geographics."

The Vons Grocery chain has 328 stores in a small geographic location:

No trash here—this film can be eaten

Clemson University researchers are studying edible food coatings made from corn, wheat, and soy to see if they can prolong the shelf life, of fruits and vegetables and possibly add nutrients.

For two years, a Clemson University agricultural engineer and food scientist have teamed up to develop this form of degradable edible packaging and find a possible market for it. The packaging films, or coatings, are made of proteins from wheat, corn and soybeans. Similar coatings or edible casings have been available for years in the processed meat industry. And interestingly enough, the creation of such films dates back to the 1820s.

According to Clemson food scientist Bob Testin, the concept is like going back to nature. "Apples, peaches, and potatoes all have natural coatings—their skins—that protect what's inside, and this concept of edible packaging would work in the same manner," he explained.

The concept is not product specific yet, Testin says. But, he and Curt Weller, the agricultural engineer also working on the project, want to compare this concept with conventional, non-edible packaging.

"We want to see if this type of film can be a straight replacement for plastic films," Testin says. "We also want to see if we can use the product as a coating to keep vegetables and fruits fresher longer in the market and at home."

Weller and two graduate students have been producing the films and are trying to perfect the amount of proteins needed to make the coating durable and pliable, yet nonpermeable. He wants to explore the possibility of applying the films, which start out as liquid mixtures, as a dip or spray for fresh food products. The proteins would then dry on the product and possibly prolong freshness.

Once the proteins dry, they enter the film state and look similar to the stretchy, opaque fruit "roll-ups" found in grocery stores. Tests indicate that the films are good barriers to oxygen and carbon dioxide, but not water. The wheat protein film shows the most potential, according to Weller.

The corn film is in commercial use already as a good coating for nut meats and candies, Weller said. "We're now looking at the corn film for higher moisture materials to determine what its potential is," Weller says of the five-year project being funded by the South Carolina Agricultural Experiment Station.

The degradability aspects of this film, while certainly a feature of the packaging, would have secondary impact in terms of waste disposal, Testin explained. If the packaging is edible, it would likely be consumed and never end up in a landfill.

In addition, similar edible protein coatings made from milk proteins are being tested by researchers with the United States Department of Agriculture.

Market segment	Metal			Glass			Plastic		
	1989	1995	2000	1989	1995	2000	1989	1995	2000
Prepared entrees*	1,350	1,200	1,200	–	–	–	200	1,000	1,500
Soup (wet)	3,500	3,700	4,055	–	–	–	20	250	500
Vegetables	5,300	4,900	4,400	100	100	100	20	200	400
Pet food	4,500	5,000	5,500	–	–	–	0	200	400
Baked beans	600	670	725	100	110	120	0	50	100
Infant formula	1,000	1,120	1,235	100	110	125	0	200	500
Evaporated milk	700	650	620	–	–	–	–	–	–
Canned meats	550	575	590	–	–	–	–	–	–
Baby food	–	–	–	1,000	1,150	1,250	–	100	225
Fish/tuna	2,000	2,470	2,860	–	–	–	–	–	–
Fruits	1,850	1,700	1,400	275	275	250	–	–	–
	21,350	21,985	22,585	1,575	1,745	1,845	240	2,000	3,625
1989-2000 % average growth rate			0.6%		1.5%			28%	

*Includes tub and tray configurations.

Source: The Dow Chemical Company.

central and southern California and Las Vegas, NV. The FreshHold package is merchandised with convenience produce products like chopped carrot sticks and cole slaw mix. Theoretically, Spezzano explained, the package should sell best when it is right next to the broccoli and cauliflower. But studies have indicated that it sells just as well in the convenience products area.

"The FreshHold package is actually another value added product on the shelf," says Spezzano. "The groups buying this product are the upper income group and those individuals who really value their time, want good nutritional food but don't want to waste time in preparation. The average person buys produce and lets it sit in the refrigerator, forgets about it, and lets it go bad. This product may actually help prevent this. In a good home refrigerator, the broccoli or cauliflower should last four days with no breakdown or loss of color."

But, the FreshHold package does have one main drawback: price. A package of broccoli florets in the FreshHold container costs $1.99 for eight ounces, a price that Spezzano says does not change a lot. The cost of the finished product is not set from supply and demand. The highest cost factors in this product are labor, materials, and transportation costs.

How well is it selling? "Not great, but it is building," says Spezzano. "We need a product like this because it meets the demands of freshness and convenience. I just hope the cost comes down; the opportunities with this product are terrific."

Change of atmosphere

Perhaps the first cousin to CAP is modified atmosphere packaging (MAP) which usually involves prepared foods. These food products are pre-cooked or processed and any packaging materials used must provide barriers to moisture and oxygen and maintain the special gas mix inside the headspace. The gas mix slows the respiration and reproduction rates of bacteria which cause spoilage over time. By slowing the reproduction of the bacteria, spoilage is retarded and shelf life of the product is extended.

One of the primary driving forces behind this technology is consumers' demand for fresh, refrigerated foods without preservatives. Many of these types of products can go from refrigerator to microwave to table in a matter of minutes. A study by Kline & Company, Inc., packaging industry consultants (Fairfield, NJ) projects that this entire CAP/MAP sector will require 11 billion packages in 1993. According to Kline, barrier bag master packs (containing individual packages similar to the traditional tray with film overwrap) will account for about 55 percent of these packages in

PACKAGING UPDATE

Chef's
Chef's
Chef's
Chef's

Now available in local grocery stores, the fresh, refrigerated meal trend has turned into the fastest growing segment in the industry. (Source: Cryovac Division, W.R. Grace & Company.)

five years. This master pack will retain special gas mixtures until it is opened at the retail store. Thermoformed or preformed individual trays sealed with anti-fog treated lidding will account for approximately 25 percent of this market in 1993. And pallet shrouds for full pallet loads and individual film bags containing up to 15 pounds of fresh product will account for the remaining packages in this sector.

Currently, the leading retail modified atmosphere package in the U.S. is the fresh pasta package. Approximately 40 percent of the market is controlled by the Carnation Company and its line of *Contadina* fresh pasta products. The package consists of rigid tray material which historically has been polyvinyl chloride sheet with a polyvinylidene chloride (PVDC) coating. The top film is commonly oriented polyester with an anti-fog PVDC coating. This is one of the few packages left in the U.S. still using polyvinyl chloride. This package contains a two- or three-serving main course and has a refrigerated shelf life of 45 days.

Gas mixtures for fresh pasta products must be accurately evaluated; only carbon dioxide has an inhibitory effect on microbiological development on food products. Normally, a 25 to 30 percent concentration in the package atmosphere is beneficial. Several different mixtures are available from different suppliers in the industry: *ALIGAL* from Liquid Air Corporation (Walnut Creek, CA) uses a protective atmosphere to displace air in a package which is then sealed, and Airco (Murray Hill, NJ) recommends using a 50:50 mixture of CO_2 to nitrogen (N_2) or a higher ratio of CO_2 to N_2 (80:20) if mold growth is a problem.

In all likelihood, the most important factor in the success of an MAP package is that the entire process must start with a hermetically sealed package. Many times, too, packagers use oxygen scavengers as well as gas mixtures to preserve product freshness. And, interestingly enough, many users feel that in order to prevent mold growth in a modified atmosphere package, an alternative may be to put water back in the product. By adding weight, there is now more oxygen in the package for the scavenger to work.

Two U.S. companies currently supply oxygen scavengers to the domestic market. Multiform Desiccants, Inc., Buffalo, NY, markets *Freshpax*, which de-oxygenates the atmosphere in a package, eliminating spoilage and deterioration of fats and oils. Processors of cheese, butter, and bakery products have shown interest in and are using the product to achieve longer shelf lives for their products.

A brand new product for packagers of oxygen sensitive foods such as meats, fruits, and baked goods is *OxySorb*, an oxygen-absorbing desiccant from United Desiccants-Gates, Louisville, KY. OxySorb reduces spoilage due to oxidation by removing excess oxygen.

The desiccant, which actually can be considered an oxygen scavenger, is sold in individual packets. OxySorb removes excess oxygen in a sealed package or container and is effective at low temperatures. The product begins to work immediately and holds deoxidizing activity up to five hours after opening the outer package without the use of preservatives.

The packets of OxySorb are placed in a sealed package alongside the food product and disposed as ordinary waste after the package is opened. At the present time, there are no domestic usages of the product.

It's already cooked

The next generation of food processing has arrived in this country. Fresh prepared foods take processing and packaging one step further—these foods are fully cooked, complete entrees that many times only require minimal heating. And, these meals are so easy to obtain because they are right in the grocery store or neighborhood convenience store. Fresh prepared, refrigerated foods offer significant opportunities to the consumer, food retailers, and packaging suppliers. Several observers have concluded that the refrigerated food trend should reach $3 or $4 billion by 1993.

The Chilled Foods Association (Atlanta, GA) represents the industry by

Campbell's
SOUPER COMBO
SWANSON
Turkey
Great Starts
Campbell's Cup
LightStyle
CHICKEN
FOR MICROWAVES ALSO!
SIX
Banana Nut Muffins
Campbell's Cup
Campbell's
Hot Fudge Brownie
Dessert Light
MICRO

Campbell Soup has introduced new packaging designs, taking some familiar products out of conventional containers and putting them into microwaveable ones. (Source: Campbell Soup Company.)

[redacted]

working with the regulatory community in developing guidelines to assure the integrity of chilled products. According to the CFA, chilled foods are fresh, prepared refrigerated foods that meet three criteria:

1. they are processed by performing some or all of the preparation steps traditionally done by the consumer or restaurant;
2. their freshness and wholesomeness is maintained primarily through refrigeration; and
3. they are ready to eat as purchased or with minimal preparation.

Under this classification, prepared chilled foods include refrigerated entrees, fresh pasta, prepared salads, cooked meats and some specialty sauces. Many of the products that are processed with or from meat receive a heat treatment to guarantee microbiological stabilization. However, these products are not sterilized; they have a limited shelf life even though they are kept under refrigeration. Some may be packed in hermetically sealed containers using MAP or vacuum methods.

"There is a tremendous need for foods that are nutritious and good-tasting and supermarkets are meeting this need and pioneering the trend," says Jerry Lyons, Marketing Programs Manager for Cryovac Division, W.R. Grace & Company, Duncan, SC. "Fresh prepared portrays certain connotations to the consumer: freshness, nutritious, and health. Now, supermarkets are not only noted for selling processed food but also fresh foods as well."

The role of fresh prepared foods may be replacing the main meal. There is now a substitution for other convenience-type meals on the market for, say, dinner. The trend probably started within the last 18 months and the awareness of the trend started in the supermarket industry.

As in all cases, any packaging materials used for fresh prepared foods should try to meet the requirements of the application as close as possible. The package does not have to be over-engineered, providing more protection than is really necessary (not to mention the increased cost factors), and it should not be under-engineered, breaking down early in the distribution process and not protecting the product at all.

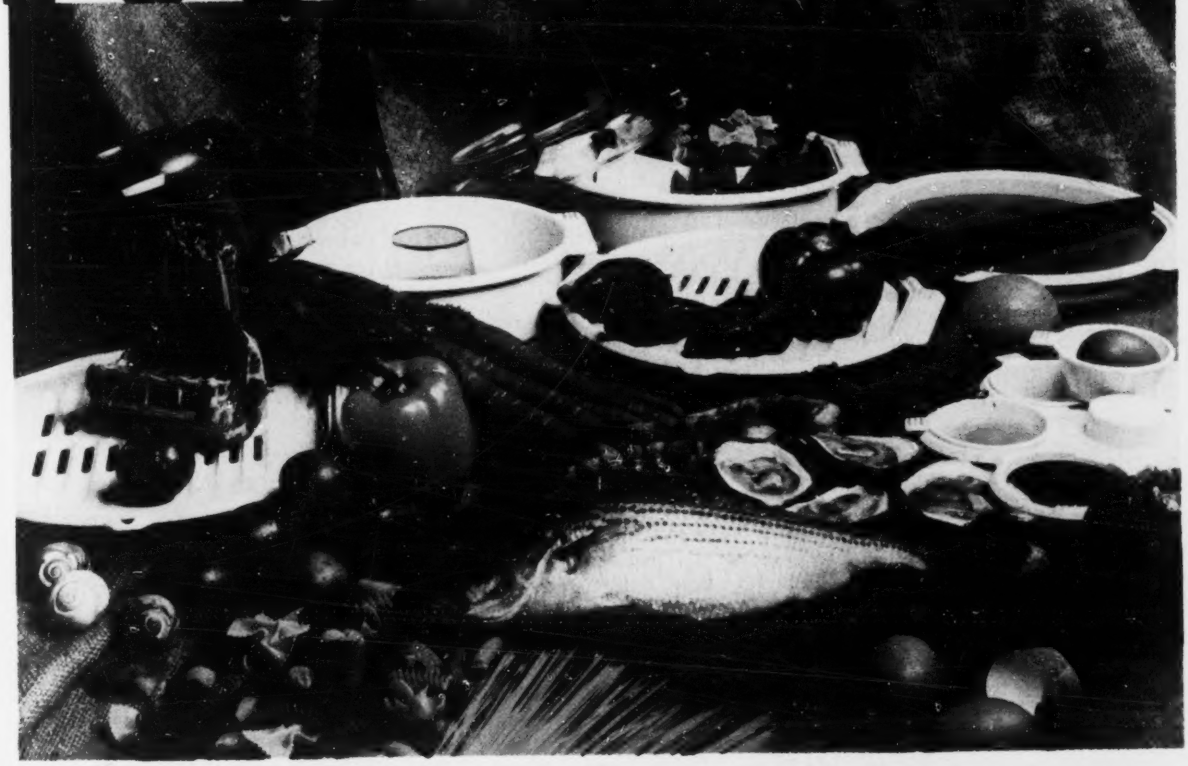
Currently, in most fresh prepared food applications, nylons, polyvinyl chloride, nitrile resins, and other polyolefins are used with success in this market. Anit-fog properties are often added to many lidding materials. Many of the trays used are composed of high density polyethylene, or crystallized polyethylene terephthalate.

And, with some success as well, the techniques of modified atmosphere packaging can be applied to the fresh refrigerated segment depending on the application. If special gas mixtures are not desired or needed, then another possibility, as discussed previously, is the use of oxygen scavengers in these products. Or better yet, just sticking with basics can ensure success: strictly-controlled processing techniques and a superior refrigeration system.

"Basically," says Jerry Lyons, "convenience is not new. But, the new thing is freshness, health, and no preservatives. With this trend, there are large entrepreneurial projects going on that relate to traditional marketing techniques. But we must remember that we can't forget the consumer in all of these efforts. This trend can be an expensive proposition and as a food program it needs commitment; you can't maintain a grocery-like mentality of price, price, price. The market needs people who can really prepare the products, display them, and store them. A lack of skills will hold companies back in this area."

So, we as consumers have many options today—fresh, frozen, shelf stable. Without a doubt, the product mix in the industry is changing because the products and packages *work*. Where we buy our products is changing too; the grocery stores, supermarkets, and hypermarkets will also influence many of the changes. "The perimeter of some of our stores is visibly increasing," says Campbell's Mel Druin, "and the processed food area is decreasing. The consumer is going for more quality and fresher foods. And the most important thing to remember is that consumers may turn out to be the competition because now they have the option to choose among any item they want. They can effectively jump from shelf stable to fresh refrigerated and get a good product."

LOOK BEFORE YOU LEAP INTO FOODSERVICE



WaveWare Excel Microwave Cookware is one of the first reusable polyethylene terephthalate (PET) polyester cooking lines available. Currently the rage in Europe, it is expected to sweep the U.S. soon. (Source: Eastman Chemical Co.)

New foodservice markets offer opportunities to ambitious food manufacturers. But, novices are warned to do their homework before knocking on any doors.

PATRICIA M. DILLON
SENIOR ASSOCIATE EDITOR

Socrates' advice to know thyself can readily apply to food manufacturers contemplating the plunge into new foodservice markets that have expanded during the last few years. Foodservice operators maintained that the one principle to which successful suppliers must adhere is to know the market thoroughly before taking the leap.

The notable trend in foodservice is the same as that which pervades the entire food industry, namely the national fixation on health and nutrition.

Some foodservice operators report that their customers seek foods with no preservatives, thus fresh foods take on renewed importance. As a result, foodservice operators seek suppliers who can deliver high quality, fresh foods consistently.

Consumer food dollars can be divided almost in half between foodservice and retail. In 1989, consumers spent $214.7 billion or 46.9 percent of their food dollars in foodservice and $243.3 billion or 53.1 percent in supermarkets and retail outlets, according to Technomic, Inc., a Chicago-based marketing firm.

"If you're in food and not in foodservice, you're missing half the business," as Daryl Boddicker, vice president of national sales and distribution, Kraft Foodservice, Deerfield, IL, noted.

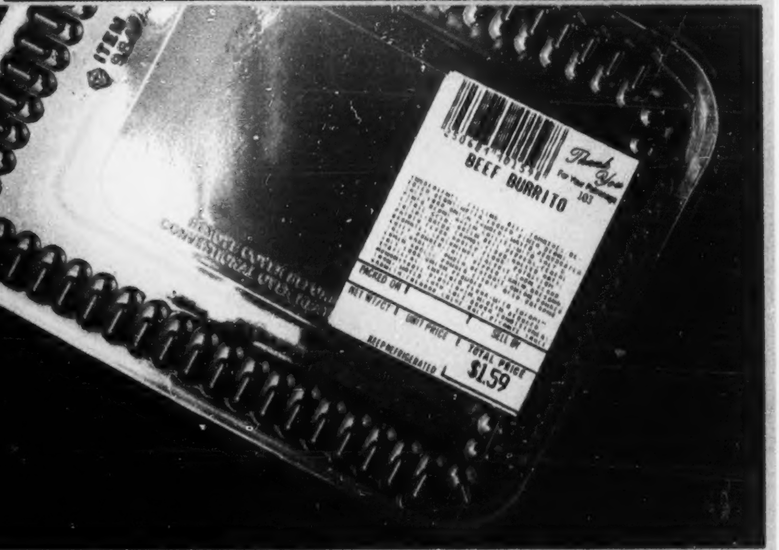
His advice to first-time foodservice suppliers? Come up with something relatively unique in either product, service or packaging. And be sure to deliver consistent quality and value for the price.

Getting to know the market begins with locating the hottest growth areas. Restaurants and lunchrooms account for the largest segment of the foodservice market with sales of $65.3 billion in 1989, up 3.5 percent from 1988, according to Technomic, Inc. Most of the growth in restaurants during the last five years can be attributed to take-out, said Roger Rumble, president of General Mills' Foodservice Division based in Minneapolis, MN. Take-out is part of all the chains owned by Stouffer Foods Corp. of Braintree, MA, said Peggy Anderson, marketing manager. Stouffers operates chains such as *J.B. Winberie*, *Rusty Scupper*, and *Parkers Lighthouse*.

As a further refinement of the take-out concept, General Mills has experimented with home delivery in the guise of *Bringer's*, home delivery of hot foods such as entrees, appetizers, sandwiches and desserts. Market testing began late March in Western Minneapolis following an earlier experiment with home delivery of more formal fare that customers themselves would heat.

General Mills owns two restaurant chains and is looking into a third. A trial outlet of *China Coast* opened in

Look Ma, no expiration date!



Since there are no laws yet governing the use of expiration dates on chilled foods, it's pretty much "an anything goes" proposition. At a suburban Philadelphia supermarket, the label clearly showed the name of the product, its unit price and its weight. However, the "packed on" and "sell by" dates were missing. When asked why there was no expiration date on the package, the deli manager pointed out that the mysterious numbers in the upper right hand corner (4007) indicated the day the food was packaged (April 7) and that on a daily basis, store personnel pull any product that is three days old. When asked about making the expiration date clear to the consumer by putting it in the "sell by" slot, the deli manager shrugged and said she didn't know how to get the computer to do that and that the consumer would just have to trust the judgment of the store. On a second visit to the store, other labels showed combinations of numbers that obviously had no correlation to a recent date (see "103" in photo).

A.G. Ebert, technical director of the Chilled Foods Association (CFA), said that supermarkets currently are not regulated to put expiration dates on food that is made and packaged within the store, but that they should.

In June, the Association of Food & Drug Officials will meet in Denver and are expected to harmonize regulations regarding expiration dates, said Mardi Mountford, associate director of CFA. Although the association's regulations are not legally binding, its decisions are often adopted as law on a state-by-state basis. Since expiration dates have been a topic of concern for many state attorneys, it is expected that states will adopt the regulations fairly quickly.

Pre-cooked sauces such as spaghetti sauce can be pumped into Cryovac bags which then are refrigerated until heated for later use. (Source: Cryovac Division, W.R. Grace & Co.)

Florida in February and will have to undergo market testing for several years before becoming a chain.

Olive Garden, an Italian restaurant chain, is another General Mills brainchild. It has been listed by ***Restaurant Business*** as number two on the list of top ten growth chains in 1988. Sales increased nearly 80 percent to more than $300 million in 1989 and sales in 1988 broke the prior year's earnings by a whopping 78 percent.

Ann Powell of Olive Garden attributes the secret of the chain's growth to the financial base provided by its parent company. Another key ingredient to its record success – seeking and maintaining long lasting supplier relationships which ensure delivering quality product on schedule, she said.

Quality is enough of a priority to Olive Garden that it has established its own microbiological lab to test product. In addition, the chain sends its own quality control inspectors to check supplier facilities.

Dick Monroe of General Mills' *Red Lobster* seafood chain wants "suppliers that know us, our strategies and objectives." Good suppliers are expected to know, as well as Monroe knows, "the importance of delivering exactly what the customer wants, even though it may contradict what *you think* the customer wants."

Bring something to the party

Good suppliers are expected to anticipate consumer trends and advise foodservice operators on how to market those trends. Monroe described the supplier who suggested how Red Lobster could become more environmentally-responsible by using recyclable packaging. "We like guys who bring information to the party," said Monroe.

Fast food	$64.2
Restaurants	65.0
Commercial cafeterias	4.2
Convenience stores	5.9
General merchandise	2.6
Other retail hosts	5.4
Lodging	7.4
Recreation	7.4
Drinking places	1.3

Source: Technomic, Inc. Food Industry Group.

One person who brought something to the party was John Dusing of Dean Foods, Franklin Park, IL. His company developed aseptic packaging for cheese sauce that unlike canned cheese, can be heated in the microwave. It is easy to handle, is pumpable and has the potential to be recycled, according to Dusing.

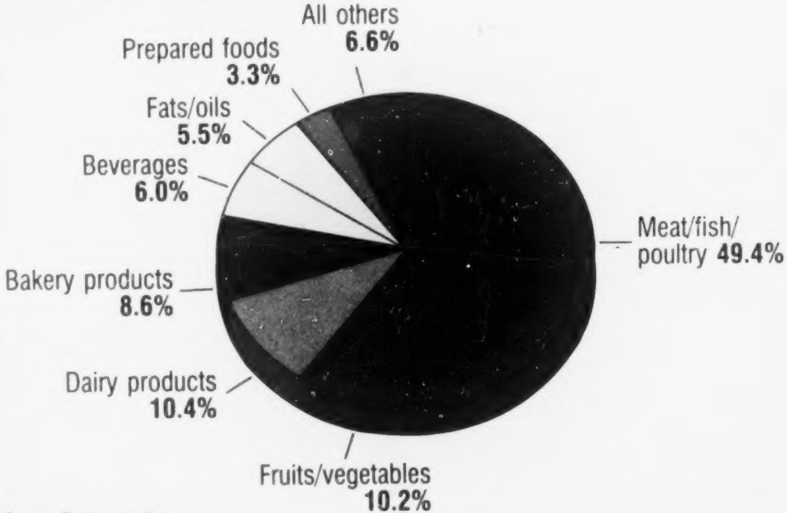
Packaging is a double-edged sword to foodservice retailers. Increased use of it is needed to meet consumer demands for convenience but operators are concerned about how to dispose of it. Portion packaging has become a vanguard within foodservice since it saves labor.

It is expected to explode over the next several years, with Kline & Co., Inc. of Fairfield, NJ forecasting sales of portion packaging to double to $200 million a year by 1993. To counter the influx of packaging, some companies are using fewer materials to give the same packaging efficiencies or using recyclable materials, such as paperboard.

Meanwhile a novel application of plastics has been achieved by Eastman Chemical Co. of Kingsport, TN, a division of Eastman Kodak. The company says it has formulated the first re-usable polyethylene terephthalate (PET) cooking lines. *Waveware Excel* microwave cookware can go from the freezer to the microwave or conventional/combination oven to the table. The cooking dishes are marketed and produced by Promoco of Roscommon, Ireland and are used throughout Europe. Industry insiders say they expect the cookware to reach U.S. shores in the near future.

Zeroing in on delis

Within the last five or six years, more food manufacturers' foodservice



Manufacturers' sales by product
1989 total = $76.57 billion

Source: Technomic, Inc.

divisions have been turning their attention to grocery stores, said Mary Kay O'Connor of the Dairy-Deli Association, Madison, WI. A virtual renaissance has been occurring in the category with foodservice supermarket deli sales reaching $1.32 billion in 1989. With total deli sales ringing up $9.56 billion and more than 19,700 supermarket delis located throughout the country, food marketers have identified a viable market with high growth potential.

However, there are two viewpoints about how food manufacturers can break into the supermarket deli market. "There's always room for innovative products, but there's no room for start-ups," said Mark Hyland, vice president of sales, Orval Kent in Chicago, supplier of many of the cold salads sold by grocery delis. "It's ultracompetitive and the present companies are meeting the food store's needs." He added that buyer-supplier relationships are tough to initiate and a company needs a lot of capital to break into the industry.

Meanwhile a more optimistic note came from Joe Salvatore, Grand Union's vice president of deli merchandising. He estimates that ten to 12 percent of the Fort Lee, NJ-based chain's supermarket deli sales volume is prepared in the its commissary; 20-25 percent in the store; and the balance supplied by outside companies.

Suppliers formulate deli products to Grand Union specifications which then become proprietary and can only be sold under the Grand Union label. Offers from new suppliers will be considered as long as the consumer demand for convenience continues, Salvatore added.

Mike Hove, chef at Goodings Supermarkets, Altamonte, Springs, FL, estimates that 90 percent of the grocer's deli offerings are prepared in-house. The remaining ten percent comprises prepared salads from outside vendors. He prefers to deal with suppliers who can offer a large variety of foods that are different from his competitors.

Mike Acuna, chef at a Vons Co. supermarket in El Monte, CA, estimates that 60 percent of the deli products are made in-house with the balance equally divided between foods prepared at the central commissary and outside vendors such as Orval Kent and small gourmet food companies. Acuna specializes in making "comfort" foods that are classic American favorites as well as ethnic specialities.

Nancy Lazara of Larry's Markets in Seattle, WA estimates an equal mix between in-store-, commissary- and supplier-prepared foods. She spared no words in saying that suppliers must upgrade the quality of their food. Larry's prides itself, she said, on offering fresh, restaurant-quality food and often supplier product doesn't measure up to standard.

Supermarkets have enthusiastically embraced foodservice to meet consumer demands for convenience since there is a higher profit margin to be earned. Food retailers' traditional profit margin, which has been one to two percent, can be 25 to 35 percent in the deli, according to Hyland.

In the quest to reach the convenience-hungry consumer, some supermarkets have not only added precooked, packaged dinners to the deli self-service section but have packed them in microwaveable packaging. Goodings Supermarkets offers lasagna, grilled chicken with rice, and Lo Mein with eggroll entrees that have been prepared in the store and put in microwaveable packaging. The packaging is complete with a label listing ingredients and an expiration date.

Expiration dates continue to be an area where grocers have creative license, since there are no federal regulations requiring them (see sidebar). A grocery store in a Philadelphia suburb has the "sophistication" to label in-store prepared foods with the product name, unit weight, product weight and a code, none of which give a clue as to the expiration date.

However, other grocers such as Goodings Supermarkets' Mike Hove, acknowledged the importance of putting expiration dates on products although he is not required by law. He added that store policy "does not try to push the limits of expiration dates."

Although foodservice offers an immense challenge to suppliers by demanding top quality, fresh foods delivered within a tight timeframe, it is a market that is worth exploring since it is growing rapidly. Food manufacturers need only to take a close look before taking the leap.

INGREDIENTS BUYERS SURVEY

FOOD ENGINEERING'S
EXECUTIVE
ADVISORY
PANEL

Natural ingredients, low-calorie formulations and fewer preservatives are all the rage.

PATRICIA M. DILLON
SENIOR ASSOCIATE EDITOR

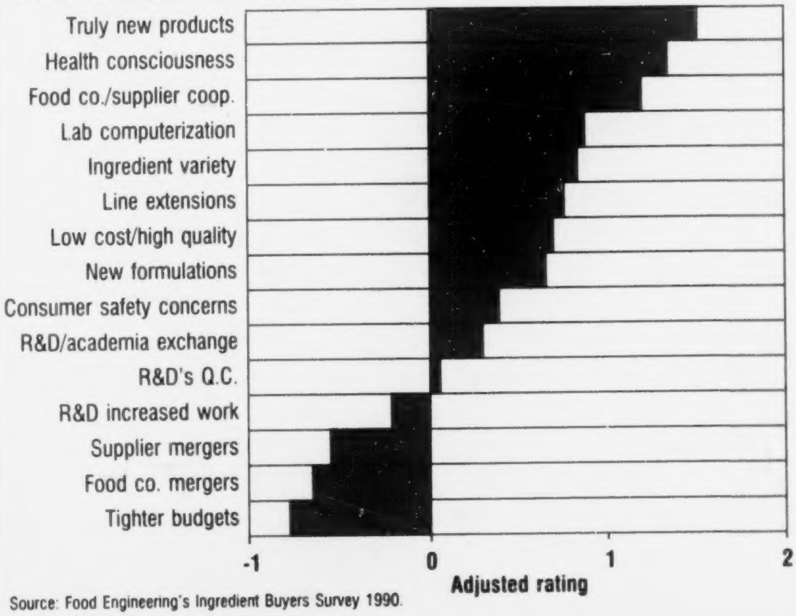
Ingredients *au naturel* will continue to be the first choice of ingredient buyers according to *Food Engineering's* latest poll of our Executive Advisory Panel. More than half of the buyers surveyed said they are seeking stable natural flavors to whet the public's demand for convenience foods that can also boast of natural flavors on the label.

Developing products that are perceived as being healthy was the top concern of the vast majority of our respondents. A Maryland vice president of product development recognized the consumer trend to diet and splurge when he forecast that the push will continue to be in the area to make desserts for health conscious consumers.

At the same time, approximately 41 percent were dismayed by the high prices of natural ingredients and a significant number were concerned about finding reliable sources for natural ingredients.

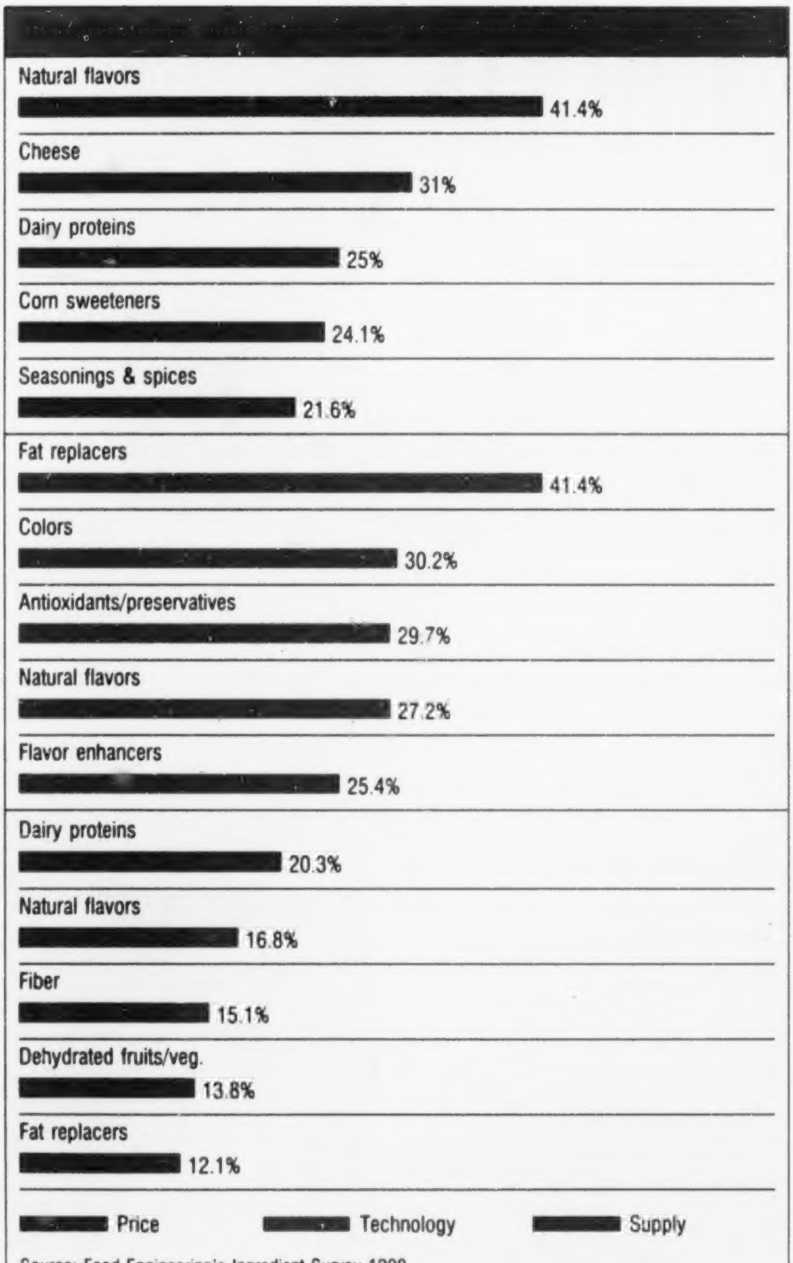
There is a trend away from preservatives as buyers place their hopes on breakthroughs in packaging and enzyme technologies. To further the development of packaging for these new preservative-free products, buyers

Positive and negative factors affecting R&D



Source: Food Engineering's Ingredient Buyers Survey 1990.

INGREDIENT BUYERS SURVEY



Source: Food Engineering's Ingredient Survey 1990.

called for greater cooperation between ingredient research and development departments and packaging companies. If preservatives are used, they must be "more effective, safer and acceptable to the public," said a Northeast vineyard owner.

If preservatives are abandoned, then new packaging will have to take up the slack as many new packaging and processing breakthroughs eliminate the need for preservatives. However, a research specialist based in Minnesota cast a shadow of doubt on the new technology by saying, "New processing techniques and new packaging are creating new products to meet marketing people's needs, but too frequently are of dubious benefit to consumers. Products are becoming needlessly costly."

Recent Food and Drug Administration (FDA) clearance of NutraSweet Company's *Simplesse* fat substitute has further widened the door to possible applications of fat substituted products. Forty-one percent of our respondents take into account fat-reduction products in their product development decisions. However, buyers are looking for fat substitutes that are heat-resistant in addition to calorie and fat-reduced. "Calorie, fat and cholesterol will be high priorities in all new research," said the president of a small Pennsylvania food company. An R&D group leader at a Minneapolis-based firm predicted that, "more fat/calorie replacement systems will be developed. Nutrition will be less of a player in the future."

However, while nutrition may take a back seat to the convenience and natural categories, market segmentation in the health area will continue. Increasingly, products are being marketed to certain diet problems, such as the lactose intolerant, diabetics and those allergic to MSG.

This generation's toaster

With more than three-quarters of America's households having microwave ovens, there is a continuing need for "lower-cost, convenient, good-tasting microwave products," according to a Canadian R&D manager. Many respondents want ingredients that can withstand high-intensity heat of microwave ovens. One R&D specialist wants to see "novel techniques of flavor encapsulation with true and stable fresh flavors."

INGREDIENT BUYERS SURVEY

	Total panel	Meat	Bakery	Dairy	Flavors/ ingred.	Canned	Fats & oils	Frozen foods	Confect- ionery	Cereals/ grains	Bever- ages
Using natural ingredients	51.3	51.3	40.3	37.0	54.3	53.3	39.6	47.2	29.4	46.6	53.6
Reducing preservatives	29.7	31.3	35.5	27.4	29.6	30.0	35.4	36.1	27.5	34.5	26.8
Vitamin fortification	14.7	10.0	11.3	17.8	9.9	3.3	12.5	11.1	17.7	15.5	14.3
Low-calorie foods	37.1	42.5	40.3	46.6	37.0	43.3	47.9	50.0	35.3	37.9	35.7
Low-fat foods	41.4	53.8	51.6	50.7	43.2	46.7	60.4	55.6	37.3	55.2	33.9
Reducing sodium content	37.5	47.5	37.1	39.7	40.7	50.0	41.7	52.8	29.4	41.4	37.5
Saturation level of fat	35.3	35.0	46.8	39.7	34.6	30.0	52.1	41.7	39.2	46.6	30.4
Reduced cholesterol	38.4	41.3	43.6	41.1	32.1	40.0	45.8	50.0	39.2	50.0	35.7
Incorporating fiber	18.1	12.5	25.8	9.6	14.8	13.3	22.9	19.4	11.8	43.1	16.1
Using non-irradiated ingredients	8.6	7.5	8.1	2.7	11.1	6.7	14.6	11.1	5.9	13.8	5.4
Using pesticide-free ingredients	34.1	31.3	21.0	34.3	34.6	46.7	29.2	36.1	25.5	22.4	28.6
HAACP conditions at suppliers	31.0	31.3	30.7	41.1	37.0	33.3	43.8	33.3	33.3	22.4	30.4

Source: Food Engineering's Ingredient Survey 1990.

Consumers currently have a tendency to use the microwave only to warm foods, causing an Alabama dairy marketing director to describe it as being, "this generation's toaster." However, a research manager at a major Midwest food and beverage conglomerate foresees a time when there will be a full-fledged microwave cuisine. Ingredients will have to withstand longer periods of heat along with combinations of microwave/convection heating without losing flavor.

Ingredient buyers report their companies continue to experiment with new combinations of ingredients in applications such as gourmet and ethnic specialties. However, nowadays new products "must be developed and tested at an accelerated pace. Business can no longer afford lengthy market test procedures," said a technical manager in Oregon. "We will become more sophisticated in screening out unsuccessful products prior to entering the marketplace. Product introductions will have a higher guarantee of success."

Another area of concern to our respondents was the problem with coloring. A Bronx executive complains about unreliable color supplies, price problems and federal bans based on the premise that "if a rodent eats 10 tons daily for a century it might develop cancer."

Roadblocks

Almost 70 percent of the ingredient buyers participating in our survey are food scientists involved in R&D. And one of their biggest complaints is the lack of time they have to develop products. Food techs lament the lack of personnel and training. Panelists also felt that upper management is too shortsighted. Companies were cited by panelists for lack of long term goals, poor communication, and slashing budgets in the wake of mergers.

There was a widespread call for more time and money earmarked for

Peering upwards into the blue sky

We asked the *Food Engineering* Advisory Panel to "blue sky" for us. What ingredient or ingredient system would they like to see which has yet to be developed?

The most frequent choices were for fat substitutes, calorie-free bulking agents, high intensity low-cal sweeteners and cholesterol-free ingredients.

More unique requests included: "True microwave flavors," from a Chicago food executive. A Missouri packaging engineer seeks "a good, low-priced 'real' chocolate flavoring." Fresher-tasting fruit flavors was a Kentucky product development specialist's dream. A Northeast beverage formulator would like to jazz up the appearance of beverages with stratification effects.

An Oregon technical service manager would like "a really super flavor enhancer to replace MSG that would not be considered an artificial ingredient." A New York baker called for expanded supplies of low-sodium baking powders and supplies for allergy diets. A greater variety of dust-free colors is needed, according to a Minneapolis plant superintendent. A Kansas director of R&D would like a low-cost meat substitute such as textured vegetable protein that has the texture of meat. Finally, an Indiana packaging engineer wishes for an edible oxygen scavenger. The list of ideas emerging from the wide blue yonder appear to be endless. However, it is also an indication that the food industry sees only the sky as its limit.

research and development. A Wisconsin cheese company's product development director said that more R&D time was needed to prevent premature introduction of products, such as oat bran, that often don't live up to taste expectations. A New Jersey food development manager elaborated on this by requesting that more definitive studies be made on the health effects of foods and food combinations. New food products should be developed that address these health concerns, he maintained, while not sacrificing taste. The food development manager called for "real innovations, not just marketing reactions."

While the major thrust in research and development is toward the development of new products, a significant portion of our respondents showed dissatisfaction with the influx of "me too" products that only imitate what is already on the market. A manager of engineering says less basic research is being done by food companies with many becoming dependent on their suppliers' R&D. An alternative proposed by an Iowa food company executive is to develop closer working relationships with major universities with good food science departments. A Northeast food technologist sees future food innovations coming from overseas or small U.S. firms.

A good number of respondents pointed out the lack of technical competence on the part of sales and manufacturing. Top management doesn't understand research and development programs and processes, said a Wisconsin technical director. Many respondents complained about having their creative and technical efforts squashed by bureaucratic procedures. Respondents also said money and time were the most valuable commodities on their wishlists.

A Midwest researcher was not alone in blasting the marketing/advertising department for pushing health claims for products that R&D must scramble to formulate. "Marketing/advertising hype is getting out of control, demanding nutritional/medical benefits which are unrealistic. It does generate new technologies, but creates two levels of moral conscience," the researcher commented.

However, consumers' preoccupation with what they *think* is healthy along with their lack of knowledge in nutrition continues to worry the industry. A Midwest food scientist notes that "consumers lock into one aspect of the food they eat due to popular media attention whether it is a proven fact or not. Next year it will be a new topic. It's hard to hit a moving target."

Several respondents said consumers need more nutrition education to be better informed on issues such as pesticides and to prevent foodborne illness.

A Chicago-area R&D specialist harpooned the media for "conflicting, incomplete and biased 'health' reporting. Lucky the company who produces a favored ingredient, such as oat bran. Pity the cookie manufacturer who used coconut oil."

FE's Ingredient Buyers Survey costs $125. To purchase it, contact: Anne Hartnett, telephone (215) 964-4444 or fax (215) 964-4273.

Circle 68 or see FEM, p. 246→

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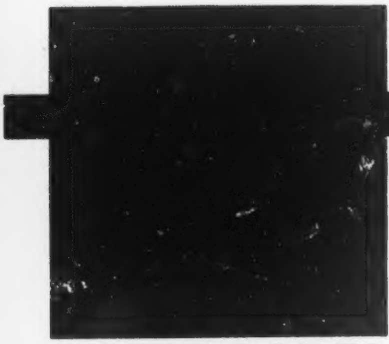
STATE OF THE FOOD INDUSTRY

FOOD ENGINEERING



ABOUT THE COVER

The food industry remained the darling of Wall Street, as food stocks outperformed market averages for the ninth consecutive year, according to *FE*'s annual State of the Food Industry report.

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SPECIAL EMPHASIS

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HEINZ
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NEW PACKAGE: **PAGE 52**

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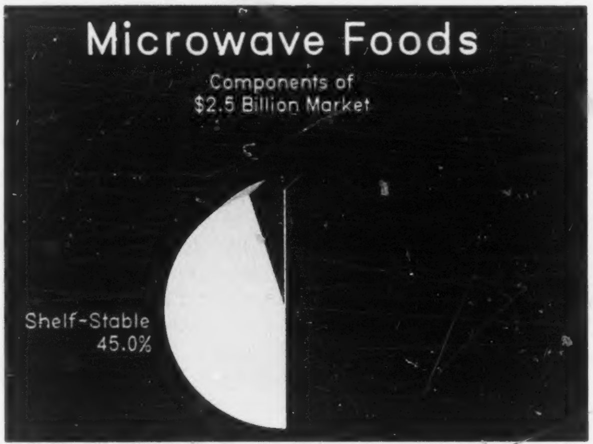
Microwave mania holds its grip

Microwaveable foods continue to be irresistible to U.S. consumers who show increased willingness to pay premium prices for convenience. Microwave food sales totaled $2.5 billion in 1989 and are expected to reach $3.9 billion in 1994, according to FIND/SVP, New York-based research firm.

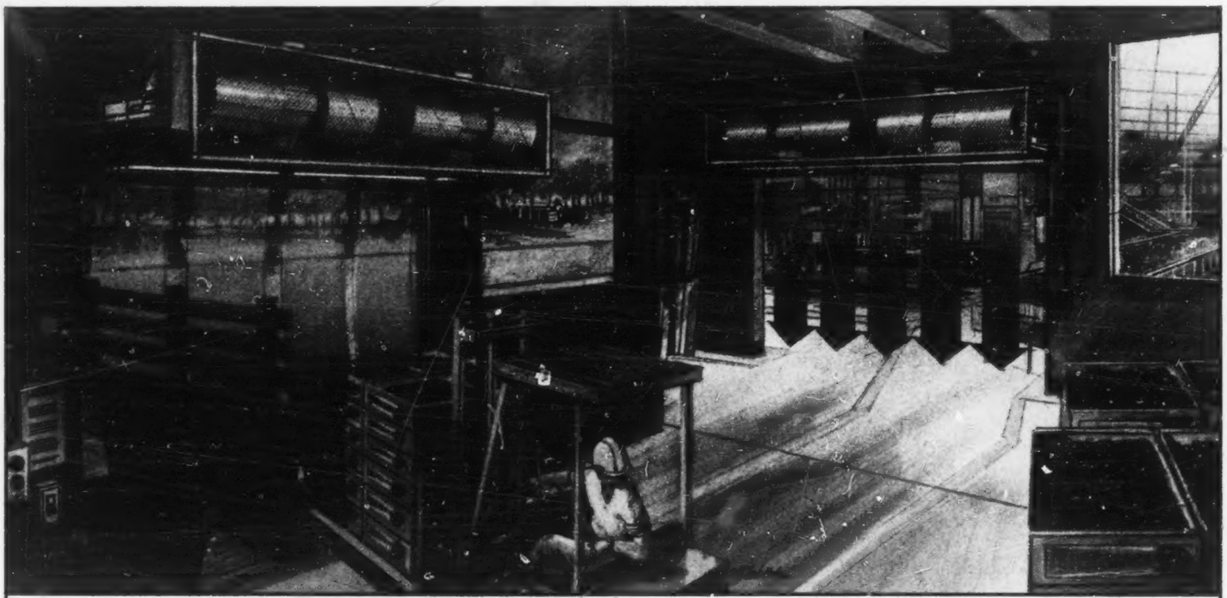
Approximately 70 percent of consumers surveyed reported owning a microwave oven with the highest penetration reaching the nation's heartland. FIND/SVP identified breakfasts and snacks as being peak times for which consumers are willing to pay premium prices. ***Popcorn is the largest single category*** *with retail sales of $740 million. For further information, contact FIND/SVP at (212) 645-4500.*



Frozen foods comprise half the microwaveable foods currently on the market.

Sous vide launched in Virginia

Vie de France Culinary, division of Vie de France Corp., McLean, VA, launched its sous vide product line with the opening of its plant in Alexandria, VA in late April. The 30,000 square foot plant will produce 70,000 meals per day.



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TECHNICAL EDITOR

PATRICIA M. DILLON

[illegible] ASSOCIATE EDITOR

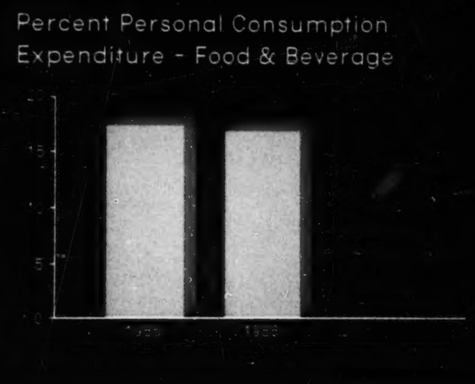
[illegible]

As shown on the adjoining table, the performance of publicly-held food-processing companies tracked by *Value Line Investment Survey* (New York City) gained consistently since 1985 and indeed throughout the decade. The 1989 slump in earnings-per-share gains—still up 8 percent over '88—was only 1 percent off the overall industrial composite of 9 percent and reflects restructuring charges taken by several large firms in '89. Examples:

- Campbell Soup Co. took a pretax $343 million charge to cover the costs of closing and consolidating older facilities, plunging '89 earnings-per-share to 10 cents from $2.12 in '88. "Much of the downside is behind us...and we are now healthy, growing and ready for the future," Campbell USA President (and interim co-CEO) Herbert M. Baum told reporters at a [illegible] CEO R. J. Ventres told shareholders at the company's annual meeting April 20.

Average annual food-industry profit growth from 1988 to 1990 should run a respectable 13 to 15 percent, *Value Line* reports, well above the 4 percent projected for the industrial composite in 1990, and the industry will maintain that 15 percent average annual growth over the next three to five years. *Value Line* classifies Philip Morris as a tobacco company and doesn't include the firm in its composite food-industry statistics, but forecasts operating profit at Philip Morris' Kraft General Foods unit to grow in line with the rest of the food industry by about 15 percent in 1990.

- *Restructuring*, as food companies refocused on core businesses and divested the diversifications of the '60s and '70s. The restructuring boom is



Consumers are spending a declining percentage of their personal consumption expenditures (PCE) on food and beverages, both in current dollars and when adjusted for inflation. Share of PCE spent on food/beverage away from home rose slightly in current dollars, and remains unchanged after adjusting for inflation. (Source: U.S. Department of Commerce.)

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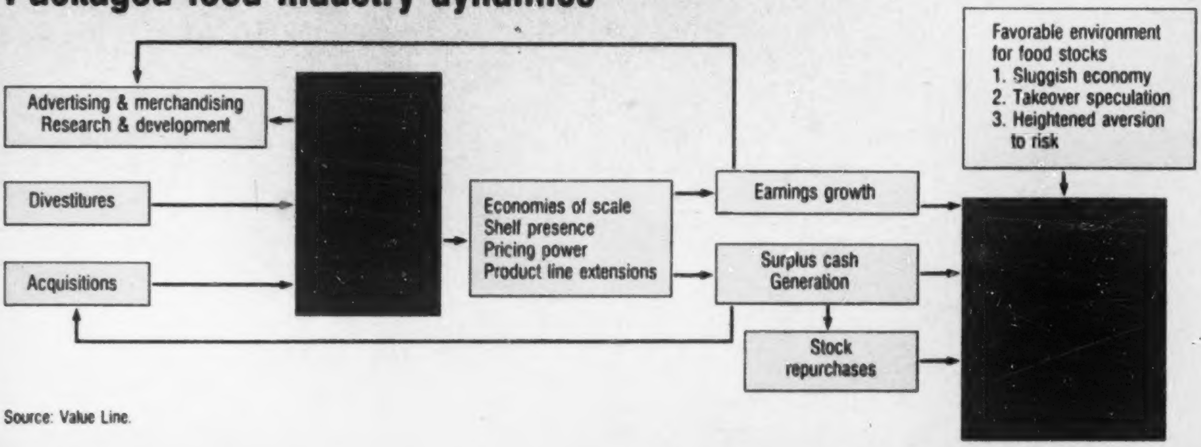
Packaged food industry dynamics

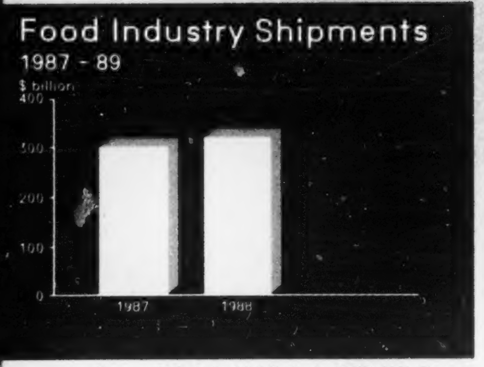

Advertising & merchandising
Research & development
Divestitures
Acquisitions
Economies of scale
Shelf presence
Pricing power
Product line extensions
Earnings growth
Surplus cash
Generation
Stock
repurchases
Favorable environment
for food stocks
1. Sluggish economy
2. Takeover speculation
3. Heightened aversion
to risk

Source: Value Line.

U.S. investment in foreign food industry vs. foreign investment in U.S. food industry (in millions of dollars)

	1983	1984	1985	1986	1987	1988
United States:						
Direct investment position	7,661	8,156	9,252	10,968	12,643	13,121
Foreign:						
Direct investment position	7,447	8,270	10,710	12,147	16,004	16,437

Source: U.S. Dept. of Commerce.



Source: U.S. Industrial Outlook, 1990, U.S. Department of Commerce.

winding down, *Value Line* believes; only a few food processors are still restructuring candidates. Examples: Castle & Cook spun off Dole to its shareholders as a separate company early this year; Quaker Oats announced late April it would do the same with its Fisher-Price toy division; Gerber divested its child-care unit and may put its apparel division on the block.

- *A focus on building brand strength* through acquisitions, divestitures, new-product development and heavy promotional outlays. Brand strength translates into economies of scale, more shelf space in the supermarket, pricing flexibility and line extensions, which in turn ultimately translate into earnings growth, surplus cash (which can be used to repurchase stock) and superior stock performance (see diagram). Brand strength further boosts the processor's "clout" in negotiating the slotting allowances and promotional costs demanded by retailers to get a new product on the shelf. According to *U.S. Industrial Outlook 1990* (Department of Commerce), "these fees, which reduce manufacturer's returns, are threatening to become a permanent part of the price structure and would lead to generally higher...food prices." Some supermarket chains last year even began demanding "failure fees" if a new product is discontinued. Outlook: "In 1990, food manufacturers are likely to launch some sort of assault on slotting fees and begin emphasizing brand-name development rather than continuing to use consumer and trade promotions as their pri-

[illegible] grades [illegible] at convenience foods, [illegible] prepared entrees in [illegible] microwaveable containers. The demand for convenience has increasingly fragmented the marketplace with opportunities for value-added niche products which attract less competition, allow greater pricing latitude and command higher margins. According to Marketing Intelligence Service (Naples, NY), new product introductions have hovered around the 3,500 per annum mark since 1986.

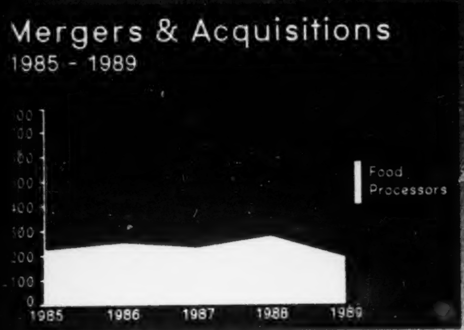
- *More capital spending* to automate and modernize plants while shutting-down outmoded facilities.

According to *Industrial Outlook*, however, the pace of capital spending slowed dramatically late in the decade: Capital outlays crept up only 1.3 percent per year to $7.2 billion for the period 1982-87, as compared to an annual rate of 9.8 percent and a total of $6.7 billion during 1977-82 – an era of high interest rates and inflation. Reason for the slowdown: heavier debt, incurred to either finance leveraged buyouts (LBOs) or to defend against hostile takeovers.

Mergermania cure?

The "go-go '80s" climate of giant, debt-financed LBOs and megamergers seems to be over for the food industry, and for American industry at large. According to The Food Institute, the total number of food-industry mergers and acquisitions fell to 556 last year from 652 in 1988, 599 in '87 and the all-time high of 724 in 1986. Food-processing mergers/acquisitions declined accordingly: 195 last year as compared to 282 in '88, 235 in '87 and 257 in '86. Biggest deals of '89:

- Tyson Foods' $1.5-billion hostile takeover of Holly Farms, which according to Chairman & CEO Don Tyson should boost Tyson's 1989 record sales of $2.54 billion to nearly $4 billion in fiscal '90. Tyson described the acquisition as "a great fit...Since most Tyson products are



Source: The Food Institute.

end.

- Nestle's acquisition of the *Baby Ruth* and *Butterfinger* candy brands plus the Pearson candy business from RJR Nabisco for about $370 million.
- Cadbury Schweppes acquisition of the *Orange Crush* and *Hires Root Beer* brands from Procter & Gamble for $220 million.
- The merger of Molson and Carling O'Keefe into Canada's largest brewer (with a 53 percent share of the Canadian market versus Labatt's 43 percent) and the sixth largest brewer in North America.

One deal that *didn't* happen: Coors' $425-million acquisition of Stroh, "but discussions continue with Stroh and other companies," said a spokesperson at Coors. Both Heileman and Stroh are in trouble, so analysts look for further brewing-industry consolidation soon.

The October '89 collapse of the junk bond market in the wake of the failed UAL takeover, the Campeau bankruptcy and the indictment of junk-bond king Michael Milken—followed by the Drexel Burnham belly-up and Milken's guilty plea bargain—cooled takeover fever.

Furthermore, few major takeover targets remain in the food industry, despite speculation surrounding the intentions of the Dorrance family (which controls 58 percent of Campbell board [illegible] the time to pursue a [illegible] the company.")

"Debt is falling out of fashion in the corporate world..." concludes David M. Blitzer, vice president and chief economist at Standard & Poor's Corp. "Although too much debt will likely burden too many balance sheets to designate the 1990s 'the equity decade,' the trends are pointing that way. Debt will not be abandoned in the 1990s, but neither will it be used with quite the license of the 1980s. Investors are coming to realize that junk bonds were not misnamed after all."

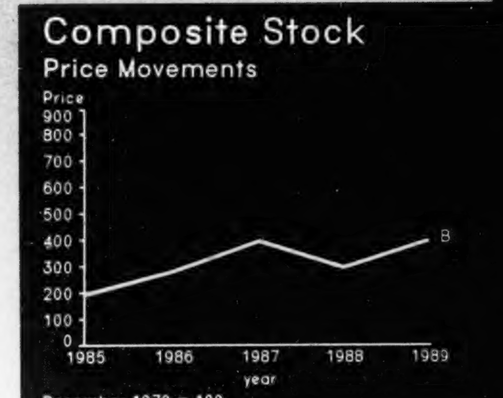
As a result, says *Value Line*, takeovers and share repurchases are now more costly, especially for food-processing companies whose stock is trading at an industry average of 20 percent above the market price/earnings multiple. Most food companies are also more highly leveraged today and thus have less financial flexibility.

Food processors, however, will continue to seek out smaller niche acquisitions. The master of this strategy is Borden, which has acquired 78 small-to-medium size firms since March of '86 with focus on growth in six areas: dairy, snacks, pasta, "niche grocery," non-food consumer products and films/adhesives.

Borden acquired seven food firms last year, including United Maple Products (syrups) and Catelli Inc. (pasta) from John LaBatt, the Gross and Kuchern-Betz bakeries in West Germany, and Moore's Quality Snack Foods (Bristol, VA).

Other notable niche acquisitions of 1989:

- Whitman's acquisitions of Orval Kent (fresh salads) and Van de Kamp (frozen foods).
- International Multifoods' acqui-



December 1970 = 100

Ten-year performance of 12 major food processors compared to NYSE composite index exemplifies how food stocks outperformed the market during the 1980s.

sition of JAC Creative Foods, which was merged with IM's SeaFest Products unit to create the the largest U.S. manufacturer of surimi products.

- Wm. Wrigley's acquisition of Reed Candy Co.

Earlier this year, Hershey acquired Ronzoni Foods from Philip Morris. This boosts Hershey's share of the pasta market to 27 percent, close to leader Borden's 32 percent.

Foreign invasion

Spurred by the weak dollar and the industry's strong financial performance, foreign investment in the U.S. food-processing industry continues to outpace U.S. investment in the food industry abroad. According to Commerce, foreign investment in the U.S. food industry reached $16.4 billion at the end of 1988, compared to U.S. investment of $13.1 billion abroad. European Community (EC) nations account for the lion's share of foreign investment: $12.4 billion worth, followed by non-EC Europe (mainly Switzerland) with $2.5 billion, Canada with $531 million and Japan with $382 million. Of EC ownership, the Netherlands accounts for $5.8 billion and the U.K. $5.2 billion. U.S. food companies hold their largest position – $7.2 billion worth – in the E.C., of which $2.7 billion is invested in the U.K. and $1.4 billion in The Netherlands. U.S. investment in Canada is $2.2 billion, in Japan $382 million.

Composite statistics: public food companies

	1985	1986	1987	1988	1989[1]	1990[1]
Sales ($ billions)	77.9	83.8	103.4	111.9	126	143
Operating margin (%)	10.4	11.0	10.4	10.7	11.0	11.2
Net profits ($ billions)	3.12	3.62	4.19	4.91	5.29	6.44
Net profit margin (%)	4.0	4.3	4.1	4.4	4.2	4.5
Earnings per-share gains (%)	+9	+11	+13	+18	+8	+21

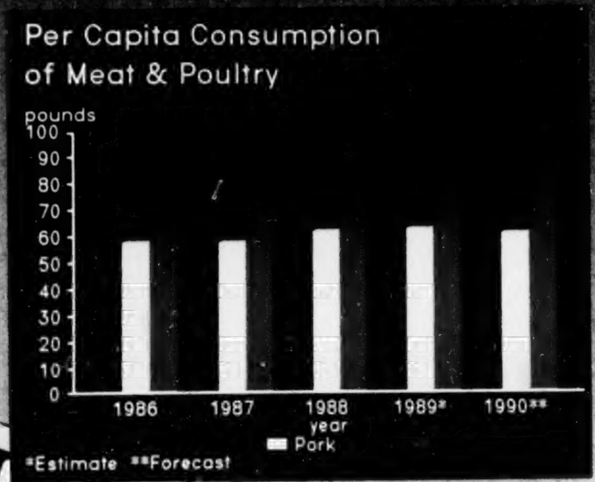
[1] Estimated

Source: Value Line Investment Survey.

Growing globalization of the food industry – spurred by EC '92, the expansion of free Europe to the East, the U.S./Canada Free Trade Agreement and the rising economies of the Pacific Rim – prompted U.S. acquisitions and joint ventures abroad. General Mills, for example, set up a joint venture with Nestle to produce breakfast cereals in Europe, using Nestle's local marketing expertise and distribution channels. ConAgra established ConAgra-Nissui, a joint frozen-food venture in Japan "which will serve as a model for future deals in Asia and Europe," says *Value Line*. Heinz, which derives more than 40 percent of its sales and profits from foreign operations, hopes to consolidate ingredient sourcing and production for three product lines it considers pan-European – ketchup, *Weight Watchers* and baby food – yet tailor these products to diverse ethnic tastes and eating habits.

Regulatory uncertainty

Meanwhile, chaos reigned on the supermarket shelf and the airways as health claims proliferated in the absence of a federal regulation and several states took the initiative in regulating health claims. *Industrial Outlook* estimated that one-third of 1988's $3.6 billion worth of food advertising contained some sort of health message. FDA, whose proposed health-claims regulation of August 1988, languished for more than a year and died at the Office of Management & Budget (who considered it too restrictive), launched a round of public hearings last October preparatory to developing new labeling regulations – including health claims – and in February of this year published its proposed new health-claims regulation, extending the commentary period through May 15. Food processors were dismayed that FDA's proposal fails to mandate federally preemption where state regulations conflict. FDA will probably publish a new health-claims regulation late this year. Health-claim confusion will thus continue through most of 1990.



ROCKY MOUNTAIN PURE

As red meat consumption continues to fall, meat manufacturers must rethink their marketing strategies. Branded beef may be one answer. Sources: Coleman Natural Beef (photo); U.S. Department of Commerce and U.S. Department of Agriculture (chart).

Marketing strategies, used successfully in poultry sales, are now becoming more important to red meat sales. Per capita consumption of red meat is not expected to increase in the near future. As a result, manufacturers are putting more emphasis on branded and other value-added products.

Frost & Sullivan, a New York City-based market research firm, predicts that slaughterers and packers will be moving into value-added businesses, offering fat-trimmed cuts and branding products.

Chicken's success in branded products, based on convenience for consumers and a fresh image, has led meat makers to try the same. But so far it has not been successful for meat marketers such as Excel, one of the first to market branded beef, (see *FE*, July 1988, page 76). Meat companies need to portray the same image as chicken or fish—red meat is convenient and nutritional.

The value of shipments by the meat and poultry products industries rose an estimated 5.4 percent in 1989 to $86.6 billion, according to the *U.S. Industrial Outlook*. Adjusted for inflation, shipments were flat. 1987 was the first year per capita consumption of poultry was greater than beef. And between 1987 and '89, per capita consumption of poultry grew 8 percent.

The estimated dollar value of red meat shipments rose 2.8 percent in '89, says the Department of Commerce (DOC). The red meat industry is expected to continue to improve profitability through product innovations and closing inefficient plants. The number of federally-inspected meat plants dropped 7 percent between '87 and '88, but the number of establishments with both meat and poultry inspection grew 48 percent.

The poultry industry is becoming more concentrated. According to DOC, processors are building more hatcheries and plants and are buying their competitors. Eight years ago, 127 companies raised or sold chickens, now only 45 remain, with Tyson, ConAgra, Gold Kist, and Perdue controlling nearly half of the production.

Poultry continues to gain with new products such as microwaveable chicken wings and chicken fried steak. Poultry accounts for 38 percent of all meat consumed, according to the Outlook. Shifting lifestyles and price both aided poultry's rise.

Pork consumption is rising slightly, and some large food companies such as Tyson, Cargill and Central Soya would like Americans to see more pork in their future. Yearly per capita pork consumption in the U.S. is just over 60 pounds, while in Europe, it's closer to 77. These companies are working on producing leaner hogs to appeal to the health-conscious.

More microwaveable meat products are on the supermarket shelves according to an American Meat Institute (AMI) poll. "Consumers can expect to see more refrigerated fresh meat and meat-based products that taste better than similar products now available in cans and in the freezer," said Tom Duesler, executive vice president at Oscar Mayer.

As for the future, constant dollar shipments of red meats are expected to remain flat for 1990. Constant dollar shipments of poultry are expected to grow 6.7 percent.

FOOD INDUSTRY

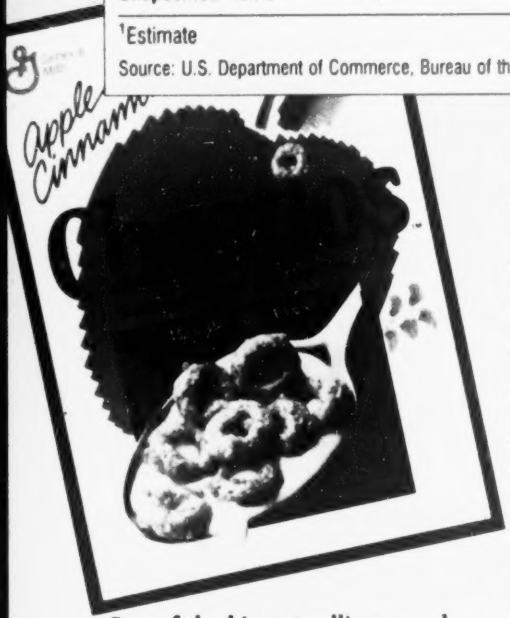
BREAKFAST FOODS

Product shipments of cereal breakfast foods (in millions of dollars)

	1986	1987	1988[1]	1989[1]
Total	4,665.0	5,080.4	5,553.9	6,416.2
Ready to serve:	4,425.6	4,711.1	5,153.9	5,915.3
Corn	1,252.6	1,302.3	1,448.1	1,664.7
Wheat	1,296.4	1 ,359.6	1,520.3	1,749.4
Oat	686.1	706.9	788.6	902.9
Rice	517.3	518.1	553.2	604.7
Mixed grains	673.8	824.2	843.7	993.6
Hot Cereals:	221.0	353.4	382.6	481.7
Oat meal	144.4	120.5	124.7	144.5
Instant	–	163.7	187.1	258.2
Farina	67.5	60.2	61.3	67.4
Mixed grains	9.1	9.0	9.5	11.6
Unspecified items	18.4	15.9	17.4	19.2

[1] Estimate

Source: U.S. Department of Commerce, Bureau of the Census and International Trade Administration.



One of the biggest selling cereals of 1989 was Apple Cinnamon Cheerios. (Source: General Mills.)

In 1989, constant dollars in shipments of the cereal breakfast food industry grew 4.5 percent, according to the *U.S. Industrial Outlook*. Higher variable costs drove up producer prices in 1989–ready-to-eat cereals went up 12.7 percent while hot cereal gained 20.7 percent and retail prices jumped 25.6 percent.

According to the Department of Commerce (DOC), most ingredient prices rose, except for oat and rice. The cost of packaging prices also went up in 1989, accounting for over 25 percent of the value of the materials consumed by the industry.

Cold cereal consumption grew only 0.6 percent in 1989, with the group consisting of bran, multigrain and fiber cereals gaining 3.8 percent. On the other hand, rice products consumption went down 3.9 percent. Consumption of hot cereal also dropped 5.1 percent. Only instant and mixed grain remained stable. Despite the fact that gains in consumption were small, retail prices grew 15.5 percent in value of total products shipments for 1989. The ready-to-eat category grew 15 percent and the value of hot cereals jumped almost 26 percent last year.

Health claims on packaging made a big splash in '89 as manufacturers introduced products containing rice bran, oat bran and multi-grain combos purporting to reduce cholesterol

One cereal, *Benefit*, from General Mills, contained psyllium grain, and claimed on the label that two servings daily reduced cholesterol by nine percent in people who also ate a low-fat diet. This was followed by Kellogg's introduction of *Heartwise*, which also contained psyllium. Procter & Gamble complained that its laxative, *Metamucil*, which contains psyllium, could not claim cholesterol-reducing properties, but the cereals could.

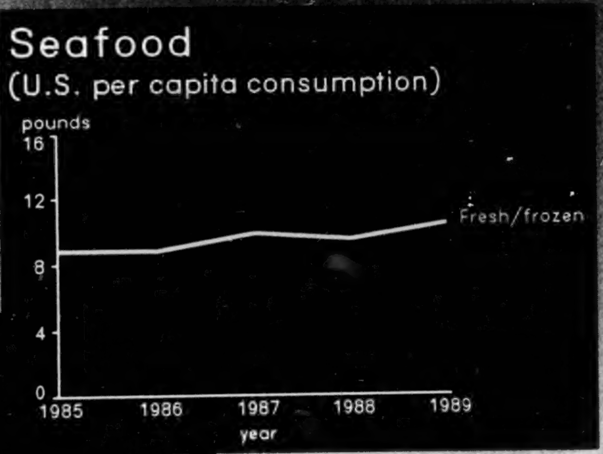
General Mills looked to boost its marketshare worldwide by entering into a joint venture with Nestle S.A to create a major breakfast cereal in Europe. General Mills currently has about 25 percent of the U.S. market for ready-to eat cereals.

Kellogg's has 41 percent of the U.S. market, but its overseas market is growing twice as fast as its U.S. market, according to a report in the *Business Week Top 100*.

The frozen breakfast market is making tremendous gains according to Packaged Facts. Between 1987 and 1988, the segment grew close to 30 percent, probably due to the convenience factor of popping the frozen entrees in the microwave.

The 1990 outlook for breakfast cereals: estimated per capita consumption will only grow 1 percent. Cold cereal will rise 1.7 percent and hot cereal will decrease 2 percent, says DOC. Retail prices may increase due to increased packaging, labor, energy and advertising costs.

SEAFOOD



Top: U.S. per capita consumption rose in 1989, after declining between 1987 and 1988. (Source: The National Marine Fisheries Service.) Below: A healthy image, new species, aquaculture and advanced technology processing have all contributed to expanded seafood usage. (Source: Fritzsche Dodge & Olcott.)

The seafood industry has had to confront safety concerns and rising prices, resulting in a lowering of U.S. per capita seafood consumption from 1987 to 1988 after five years of increases. But as the industry has dealt with these issues, seafood consumption is rising again. The National Marine Fisheries Service (NMFS) reports 1989 U.S. per capita seafood consumption at 15.9 lbs.

The National Fisheries Institute (NFI) points out that while about 90 percent of food-borne illnesses caused by seafood have been attributed to raw molluscan shellfish (i.e., oysters, clams, mussels), scombrotoxin and ciguatoxin, the number of outbreaks reported to the Center for Communicable Diseases in Atlanta has not been increasing, despite increased consumption.

Still, the seafood industry has been working with the government to develop a mandatory federal inspection program designed specifically for fish and seafood. NFI believes a seafood inspection system should be federally funded, as are meat and poultry inspection. And it should include: certification of processing ships and plants; surveillance of operations; inspection of imports; more toxic substance monitoring; and enforcement against economic violations. FDA and NMFS announced in March that they are planning a new voluntary inspection service for fish and seafood based on the Hazard Analysis Critical Control Point (HACCP) concept, with additional parameters.

Mandatory seafood inspection to help alleviate consumers' concerns about seafood safety, and a greater awareness of the health benefits of seafood, with continued research on omega-3 fatty acids and other areas, are contributing to the growing importance of seafood in U.S. diets.

Another encouraging facet of the industry is increased exports of seafoods for the second year in a row. Exports are expected to climb to nearly $4.9 billion in 1989, according the *Industrial Outlook 1990.* This leaves the U.S. with a total marine products trade deficit of about $4.1 billion, down from $6.5 billion in 1988.

The U.S. seafood industry is also increasing aquaculture production which is now responsible for about 790 million pounds of fish and seafood annually—equal to about 5.5 percent of the total domestic supply, reports NFI. Increased aquaculture production is expected to help meet a growing demand for seafood.

Surimi usage in the U.S. is one of the success stories of the '80s. Americans consumed an estimated 135 million pounds of surimi seafood products in 1989, up from 18 million pounds in 1982, reports the Surimi Seafood Education Center of the National Fisheries Institute (Washington, D.C). Educating processors and consumers on expanded uses of surimi; a healthy image; and raising prices of seafood products have all contributed to surimi's escalated use.

USDA projects that U.S. per capita consumption of seafood could reach 17.2 pounds by the year 2000. Exports are also expected to increase—10 to 15 percent during 1990, according to the *Outlook*. And seafood product shipments are likely to show a real gain of 1.5 percent in 1990.

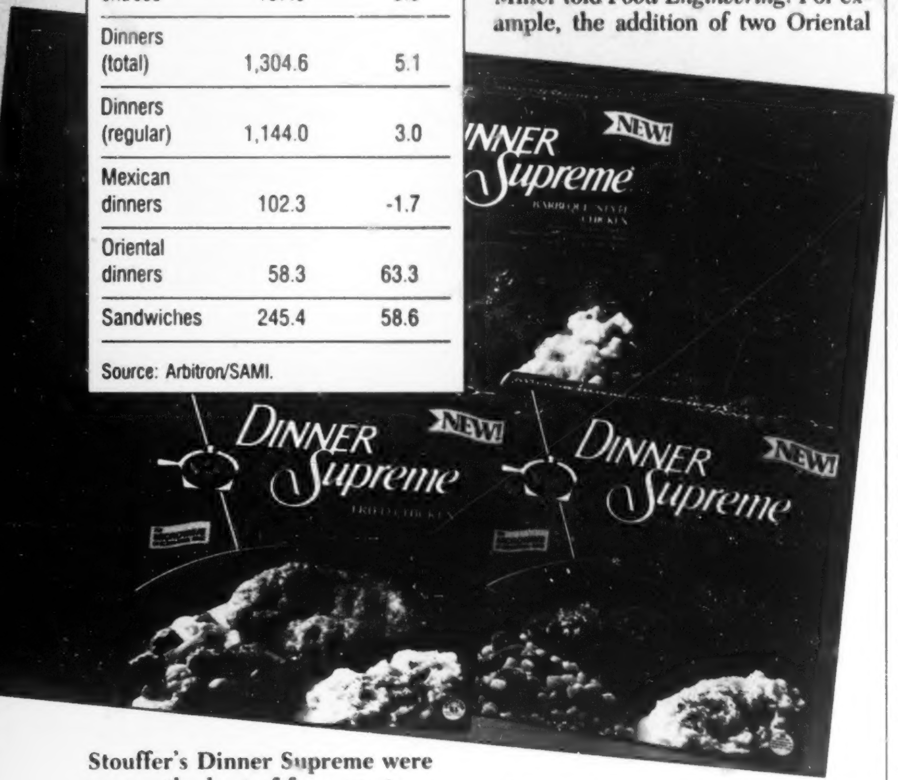
STATE OF THE FOOD INDUSTRY

FROZEN FOODS

Frozen entrees and meals

	1989 ($ value, millions)	% increase over 1988
Entrees (total)	3,218.8	1.8
Poultry entrees	1,129.2	2.4
Meat entrees	424.8	0.8
Fish entrees	120.6	-5.1
Italian entrees	824.0	-1.9
Mexican entrees	309.8	11.5
Oriental entrees	197.0	-9.0
Dinners (total)	1,304.6	5.1
Dinners (regular)	1,144.0	3.0
Mexican dinners	102.3	-1.7
Oriental dinners	58.3	63.3
Sandwiches	245.4	58.6

Source: Arbitron/SAMI.



Stouffer's Dinner Supreme were among the host of frozen entrees introduced in 1989. (Source: Stouffer Foods Corp.)

Frozen foods were first introduced to the American market in 1930. Since then, the U.S. frozen food industry has grown to over $12 billion (the value of 1989 shipments), according the *U.S. Industrial Outlook 1990*. This amounted to a 5.4 percent increase over 1988. Adjusted for price changes, industry shipments increased by 2.4 percent.

Value of 1989 frozen entrees alone was $3,218.8 million—a 1.8 percent increase over 1988, reports Alan B. Miller, Jr. of Arbitron/SAMI (New York). And 1989 sales of frozen dinners were $1,114.0 million—a 3.0 percent increase over 1988.

"Real growth, though, will be in the 'healthy' frozen entree/dinner area," Miller told *Food Engineering*. For example, the addition of two Oriental style *Healthy Choice* dinners from ConAgra (Omaha, NE) was largely responsible for the 63.3 percent growth in sales of this category between 1988 and 1989.

The success of ConAgra's Healthy Choice frozen entrees and dinners and Stouffer's (Solon, OH) *Right Course* frozen entrees has lured others into the "healthy" frozen food arena. Campbell Soup Co. (Camden, NJ) introduced *Le Menu* Eating Smart Dinners in Canada featuring lower salt, fat and cholesterol than the regular Le Menu line. And Kibun Products International, Inc. (Raleigh, NC) launched a line of eight health-oriented entrees—four chicken, one beef, one vegetarian and two seafood. The line averages less than 3.8 grams of fat per dish and 12 percent of total calories from fat.

Stouffer Foods Corporation is not only marketing a line of health-oriented frozen entrees, it recently announced the reformulation of its calorie-controlled *Lean Cuisine*. The company does not expect the reformulated Lean Cuisine to compete head-to-head with Right Course. Right Course is targeted at older, health-aware consumers while Lean Cuisine is aimed at younger people. The average sodium content of Lean Cuisine entrees is now 860 milligrams. When the line was introduced in 1981, each entree averaged 1,100 milligrams.

H.J. Heinz Co. (Pittsburgh, PA) is also a major player in the healthy frozen food arena with its *Weight Watchers* line. The Weight Watchers unit has grown 20 percent a year over the past five years and is expected to be the firm's largest unit by 1995.

"I believe that we are still underestimating the potential of this remarkable brand [Weight Watchers]," said Heinz Chairman/CEO Anthony O'Reilly at a March 15 meeting with security analysts.

A steady increase in frozen food sales will continue, despite competition from shelf-stable and chilled foods. And, health will be a major driving force behind new frozen foods.

REFRIGERATED FOODS

New technologies are expected to revive the refrigerated or chilled food category. Figures on the the current size of the market vary, depending on how it is defined. A Michigan State University study estimates that fresh prepared foods account for about $500 million. If one includes all refrigerated meals not consumed on premise (including foods such as take-out refrigerated pizza), the market is $50 billion, with $30 billion of that in foodservice. According to Carl Randall, CEO of Culinary Brands, Inc. (Sausalito, CA) that will double in the next five to ten years. And, a "new generation" chilled foods (i.e., sous vide or modified atmosphere packaged) will create approximately a $200 million market.

Distribution problems and lack of consumer education have been major stumbling blocks to consumer acceptance of refrigerated foods. (Source: Cryovac, Div. of W.R. Grace & Co.)

The Chilled Foods Association (Atlanta, GA) defines chilled foods as "fresh-prepared, refrigerated foods that meet three criteria: 1) They are processed by performing some or all of the preparation steps traditionally done by the consumer or restaurant; 2) their freshness and wholesomeness is maintained primarily through refrigeration; and 3) they are ready to eat as purchased or with minimal preparation." This would include refrigerated entrees, prepared salads, complete meals, fresh pasta, cooked or partially cured meats and poultry, soups and sauces; but would not include milk, butter, cheese, yogurts, packaged produce, fresh or cured meats and refrigerated doughs.

Several of the earlier players in this arena pulled product from the market due to problems with distribution. Controlling the temperature throughout distribution is critical with refrigerated foods. FreshNes™ Foods Corp., a division of Nestlé Corp. (Solon, OH), uses direct store delivery for its *FreshNes* Fresh made meals (in test market in Cleveland and Columbus, OH). Kraft General Foods (White Plains, NY) also uses direct store delivery for its *Chillery* line (in test market in Kansas, MO). Carnation's *Contadina-Fresh* line of sauces and pastas has completed its first year in national distribution.

While Culinary Brands, Inc., Sausalito, CA, recently pulled its retail line of sous vide from the market due to lack of consumer knowledge about chilled foods and distribution problems, Randall still feels that retail chilled foods will be one of the biggest growth areas in the '90s.

"As technology develops, a whole new chilled foods distribution system will develop over the next 10 years where chilled foods will be kept below 32°F but above their freezing point," predicted Randall.

Currently, Culinary's vacuum cooked products are quick frozen for distribution to its foodservice customers. "We still offer exceptional quality, but until chilled distribution systems are improved, our customers prefer to have the products frozen," Randall explained.

Frank DiGiacomo, of FreshNes, agrees that more education of consumers is needed. The company began a new ad campaign in January.

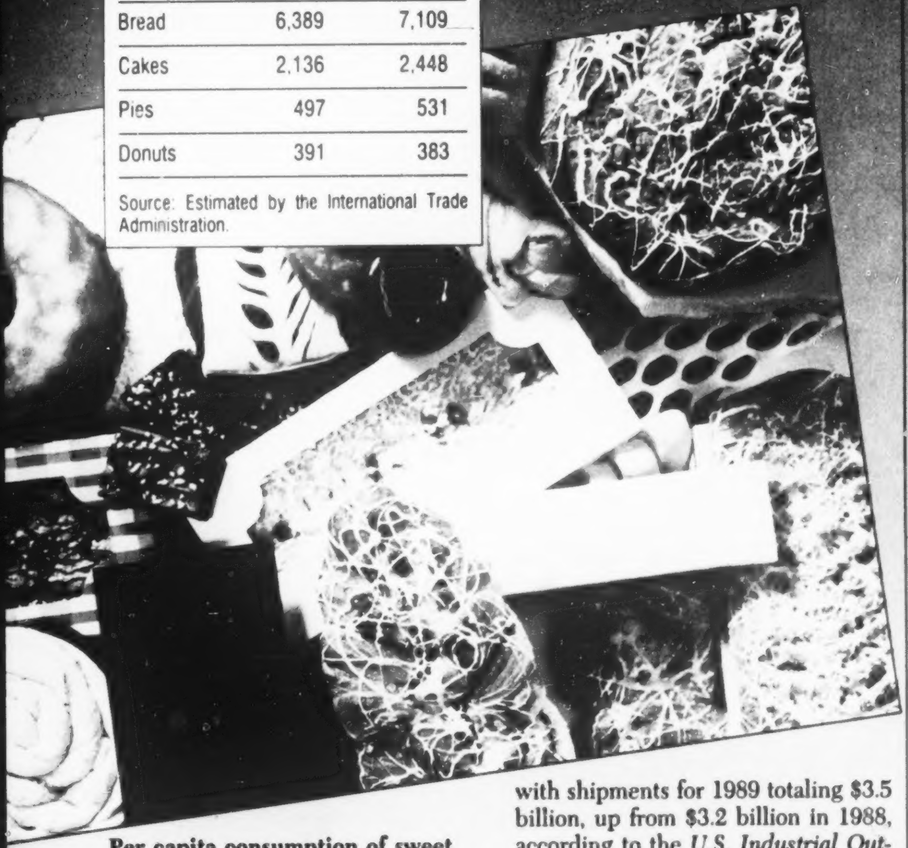
OF THE FOOD INDUSTRY

BAKERY PRODUCTS

Bakery product shipments (in millions of dollars)

	1988	1989
Bread	6,389	7,109
Cakes	2,136	2,448
Pies	497	531
Donuts	391	383

Source: Estimated by the International Trade Administration.



Per capita consumption of sweet baked goods increased 4.2 percent and is expected to reach 4.16 pounds per person in 1990. (Photo source: Entenmann's Inc.)

The big story in the bakery for 1990 is the reestablishment of white bread as a growing category. Pulling out of 25 years of doldrums, white bread has maintained steady growth since 1982 with shipments for 1989 totaling $3.5 billion, up from $3.2 billion in 1988, according to the *U.S. Industrial Outlook*. It attributes the triumphant return of white bread to better formulations by manufacturers and its bland flavor that appeals to increasing segments of the population: old folks and kids. It further estimates that white bread will gain 5.6 percent in constant-dollar value shipments.

Sales for the entire bakery category rose to $16.9 billion in 1989, up from $15 billion in 1988, according to the Outlook. Snacking and grazing has driven consumers into the bakery section and once there, shoppers seek baked products that fit their conception of healthy foods. This explains the drop in donut shipments ($383 million in 1989 compared to $391 million in 1988) as consumers push them aside in favor of bran muffins. Although the delirium over oat bran has calmed down, the demand for bran products has remained steady.

However, sales won't be warming up in all areas of bakery. Per capita consumption of *frozen* bakery products has been melting 6.7 annually since 1982. The category is expected to make no more than a one percent gain in shipments this year. Consumers have switched from frozen pies to desserts that require less preparation, such as fresh baked goods.

Supermarket bakeries present an increasing challenge to food manufacturers who traditionally dominated the baked food segment. In-store bakery sales totaled $7.5 billion in 1989, up 17 percent over 1988, according to the American Institute of Food Distributors, Inc., Fair Lawn, NJ. The heat of competition isn't expected to let up since the number of in-store bakeries (presently at 22,288) is expected to grow by two percent. By establishing preparation areas that are visible to the shopper, retailers are imparting a perception of freshness to their products that continues to challenge bakery companies.

Some of the trendsetters in retail outlets, according to the International Dairy-Deli Association, Madison, WI include: miniature Danish, miniature muffins, gourmet cookies, and crusty breads, such as French bread or rolls.

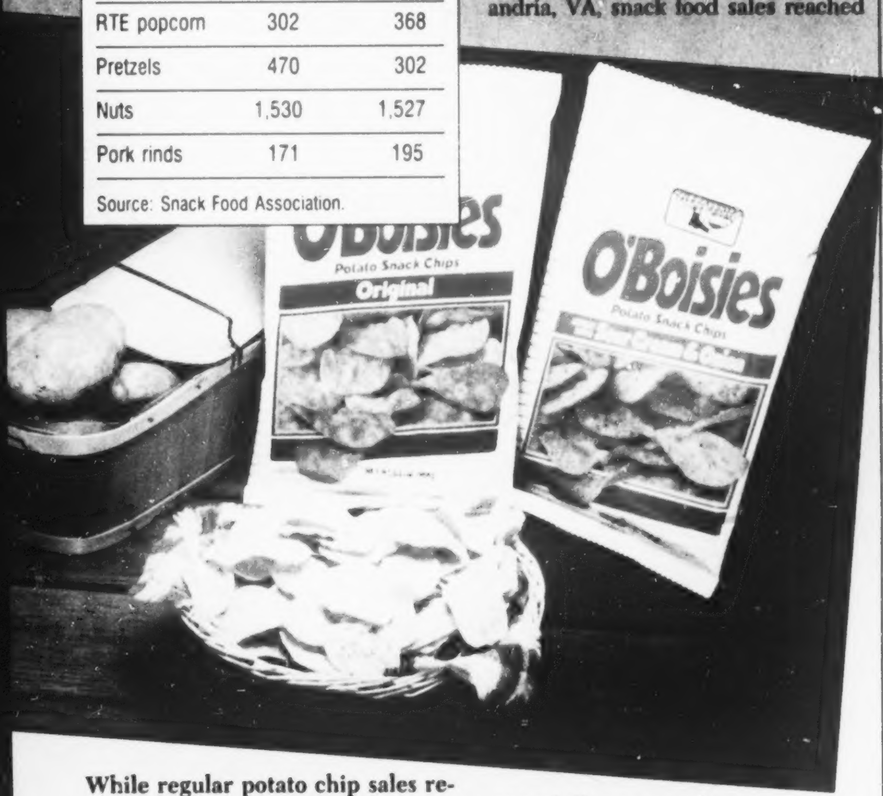
For the first time, the Outlook has tracked bagels whose per capita consumption rose from 2.47 in 1988 to 2.86 in 1989. This year, per capita consumption is expected to reach 3.24. In addition, the soft cookie segment has been stale since the $560 million category tumbled to less than $300 million between 1984 and 1989. However, the Outlook projects that the category may be resuscitated in the future with formulations using fat substitutes such as Olestra.

SNACK FOODS

Snack food sales (in millions of dollars)

	1988	1989
Potato chips	3,598	3,917
Tortilla chips	1,844	2,104
RTE popcorn	302	368
Pretzels	470	302
Nuts	1,530	1,527
Pork rinds	171	195

Source: Snack Food Association.



While regular potato chip sales remained flat, sales of sour cream varieties increased 8.8 percent, according to SFA. (Photo source: Keebler Co.)

Jay Leno's pitch for Frito-Lay—"Crunch all you want, we'll make more" aptly describes the American phenomenon of snacking—we certainly are crunching all we want and snack food companies *are* making more. In a new study released by the Snack Food Association (SFA), Alexandria, VA, snack food sales reached $11.9 billion, up a whopping 9.4 percent from 1988.

Tortilla chips, ready-to-eat (RTE) popcorn, microwaveable popcorn, pretzels, onion rings and President Bush's favorite, pork rinds, are all posting significant gains. SFA reports 1989 sales of tortilla chips reached just over $2 million, an increase of 14 percent from 1988. Al Rickard, SFA director of communications, said low salt and no salt varieties of tortilla chips appear to be doing well, with double-digit growth being realized for ranch, salsa and regular flavors.

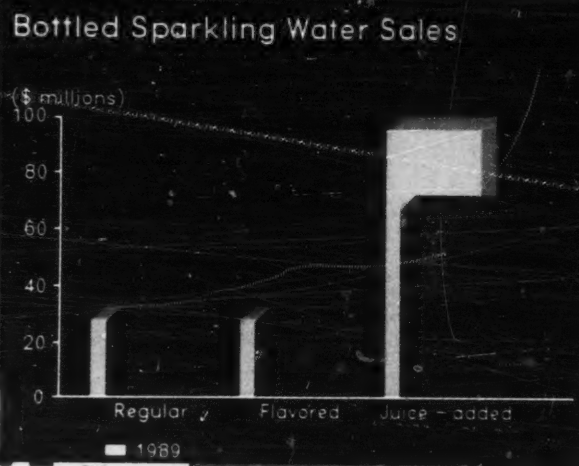
Although low oil varieties presently comprise only a fraction of the tortilla market, consumer interest has doubled market share to make low-oil tortilla chips a promising market, according to Rickard. However, he added that up to 22 percent of the sales gains made by tortilla chips during the past year have been the result of manufacturer promotions.

RTE popcorn sales have grown steadily over the past few years with 1989 sales reaching $368 million, an increase of 22 percent over 1988. Cheese-flavored varieties dominate the popcorn segment since large retail displays have spawned much of its success. White cheddar-flavored popcorn comprises 8.5 percent of the category and has shown a tremendous sales increase of just over a third from 1988. Sales of caramel popcorn, which are almost 12 percent of the market, have dropped 14 percent.

However, caramel popcorn is a winner in the microwaveable popcorn category. America's love affair with the microwave has boosted microwave popcorn sales close to $822 million, an increase of 4.9 percent from 1988 which was an incredible increase of 28.4 percent over 1987.

Meanwhile, the perennial American classic, potato chips, stumbled with an 0.8 percent dip in shipments. A potato shortage was responsible. The slack was taken up by corn chips, which posted a 22 percent gain over 1988 with 1989 sales of $635.7 million. Regular and ridged chips (three quarters of the segment) remained flat; while kettle-style potato chips (one percent of the segment) jumped 17 percent in sales.

Pretzels continue to show strong growth with regional preferences fanning demand for a variety of configurations which have all shown double digit growth: hard dough, sticks, thins, rods, nuggets and minis. Sales for pretzels in 1989 totaled over $557 million, up more than 18 percent from 1988.



Sales for soft drinks have been bubbly, at a rate of $23.7 billion for 1989. (Source: New York Seltzer Co.)

Global markets are opening up quicker than you can snap open a can of cola and beverage manufacturers are quenching their thirst for opportunity in both Eastern Europe and Asia. Clearer access to world markets has been a boon for Coca-Cola which gets 75 percent of its profits from overseas markets and Pepsi-Cola which makes 20 percent of its profits abroad. A receptive global market has also been a godsend to the alcoholic beverage industry, which has been able to continue increasing production while domestic sales have decreased.

Soft drinks have been bubbling at a rate of $23.7 billion in 1989, according to estimates by the U.S. Department of Commerce provided by Business Trend Analysts (BTA), Commack, NY. And sales are projected to almost double by 1998 to $42 billion.

Diet beverages have been responsible for much of the industry's growth with low-calorie drinks comprising more than 27 percent of total industry volume in 1989, according to BTA. Per capita consumption of diet soft drinks is expected to grow 5.2 percent annually into the next decade to reach 20 gallons by 1998.

Non-caloric sweeteners have eliminated the aftertaste often attributed to [illegible] bright future. Market leader Diet Coke pulled down 31.4 percent of the diet market, followed by *Diet Pepsi* with 20 percent, according to BTA. As the Calorie Control Council recently reported, men are equally weight-conscious as women and now both genders are targeted by diet soda advertising.

Meanwhile production of alcoholic beverages in 1989 went up 3.5 percent over 1988, a total of $21.5 billion. However, much of the increase was for export since U.S. consumption of alcoholic beverages continues to drop. Last year, per capita consumption of beer dropped 1.7 percent, 4.4 percent for wine and 6.7 percent for distilled spirits, according to the *U.S. Industrial Outlook.*

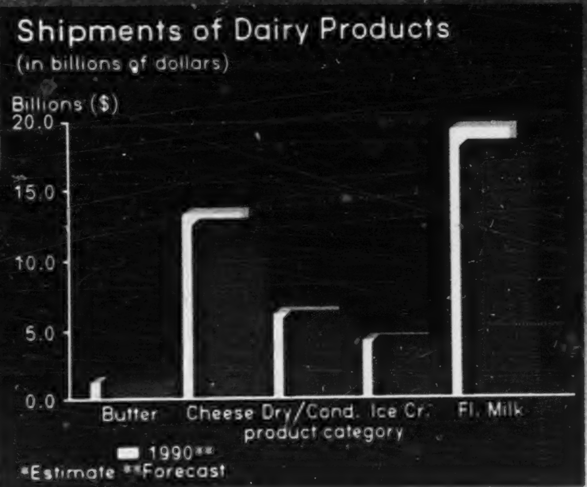
Analysts say the lack of interest in hard liquor predates the current nutrition craze – that instead most of today's younger consumers never acquired a taste for spirits. Also, demand for wine coolers has dried up since 1988, accounting for most of last year's sour wine sales. This dry spell is expected to spur mergers of wine-producing companies.

The picture isn't as dark for beer producers. Many former import-beer drinkers are turning toward domestic brands. Some industry observers have said that import sales are declining because the mystique surrounding imports have fizzled since many overseas firms now operate breweries in the U.S.

Meanwhile, fascination with the exotic has found a new outlet, as demonstrated by the bursting market for juice and juice-drinks. Flavors, such as kiwi, guava and other tropical favorites, have fanned much of the passion for these beverages.

In fact, over the next five years, the $10.9 billion market is expected to repeat the 35 percent growth achieved from 1983 to 1988, according to Find/SVP, a New York-based market research firm.

DAIRY PRODUCTS



The dairy industry boasted a favorable year in 1989 with an increase of 3.3 percent in product shipments. Cheese products lead the way with a 13.5 percent increase in shipments. (Photo source: Dohler; chart source: U.S. Department of Commerce; 1990 U.S. Industrial Outlook.)

The dairy industry is unique in that one of its major products, milk, is both a principal ingredient and major end product of the market. The *U.S. Industrial Outlook* reports that the dairy industry had a favorable year in 1989 and measured in constant dollars, total value of dairy product shipments rose 3.3 percent, ranging from a 6.4 percent gain for cheese to a 3.5 percent drop for butter. Fluid whole milk represents 78 percent of the weighted average value of materials consumed in the dairy industry. Cream and fluid skim milk follow at seven and one percent, respectively. With escalating raw milk prices, producer and retail prices for dairy products took off in 1989.

The events of 1989 are a reminder that market prices are not always determined solely by the amount produced and demand conditions, says James J. Miller, Agricultural Economist with the United States Department of Agriculture. At the Annual Agricultural Outlook Conference held last November, Miller pointed out that certain industry decisions and events turned what could have been a moderately tight market into a chaotic market with record prices.

Several of these events resulted from the federal government's buy-out programs to support the farm price of milk. The Industrial Outlook reports that government inventories of dairy goods grew 45.8 percent to 26.9 billion pounds in 1989. Purchases of butter accounted for most of this increase. In effect, the government purchased 55.6 percent of 1989 butter production.

The biggest winner in the dairy industry in 1989 was cheese. The total value of product shipments of cheese jumped 13.5 percent in 1989. Changes ranged from a 16.9 percent increase for natural cheeses to a 0.3 percent gain for cheese substitute, says the Outlook.

Per capita consumption of all cheese fell 1.2 percent. But, specialty-type cheeses showed the best growth with Italian types leading the way, increasing 6.3 percent. Mozzarella accounted for much of this increase since it is a main ingredient for pizza. Ricotta cheese rose 7.5 percent and cream cheese jumped to 9.3 percent because of the popularity of its use on bagels.

In other areas, the Outlook reports the value of product shipments for ice cream and frozen desserts rose 3.4 percent. Yogurt products also experienced healthy growth as the value of shipments jumped 10 percent in 1989; per capita consumption rose 3.1 percent. Frozen yogurt, in particular, rang up a whopping $1.2 billion in sales in 1989, according to FIND/SVP, New York. The value of these sales reflects a 516 percent increase over 1985, or a compound annual growth rate of 57.6 percent. Sales growth, says FIND/SVP, has been due to two major factors: an increase in the number of outlets offering frozen yogurt and an increase in average store sales of frozen yogurt. FIND/SVP predicts that the growth in the frozen yogurt market is expected to level off in 1991 or 1992. The company also expects to see a wider variety of novelty products such as frozen yogurt-based bon bons.

CONFECTIONS

Trends of confectionery products (in millions of dollars)

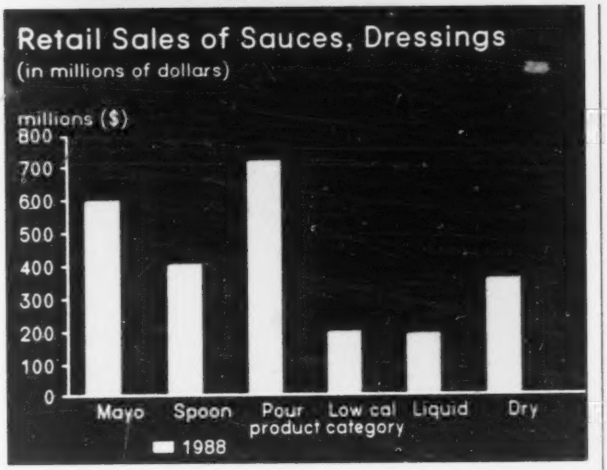
	1988[1]	1989[1]	1990[2]	Percent change 1988-89
Industry data:				
Value of shipments	7,708	8,145	8,634	5.7
Value of shipments (1987$)	7,632	7,809	8,062	2.3
Product data:				
Value of shipments	7,692	8,138	8,627	5.8
Value of shipments (1987$)	7,616	7,802	8,055	2.4

[1] Estimated; [2] Forecast.

Source: U.S. Department of Commerce: 1990 U.S. Industrial Outlook.

The confectionery segment of the food industry is still proving sweet for manufacturers as the value of industry shipments for candy and other confectionery products was an estimated $8.1 billion in 1989, an increase of 5.7 percent over 1988 figures, according to the *1990 U.S. Industrial Outlook*. The Outlook reports that in 1989, U.S. candy consumption was estimated at 4.8 billion pounds, a 2.6 percent rise over 1988 consumption. Chocolate candy consumption in 1989 increased an estimated 2.5 percent to 2.5 billion pounds while consumption of nonchocolate candy was estimated to increase 2.7 percent over 1988 to 2.1 billion pounds. Consumption of candy not specified by kind rose 2.6 percent in 1989.

DRESSINGS & SAUCES



Source: Arbitron/SAMI.

In 1989, dressings and sauces accounted for $3.3 billion in retail sales, a six percent increase from 1988, reports Arbitron/Selling Areas-Marketing (New York). Sales of these products have been and will most likely continue to be affected by health trends: low fat, low calorie, and cholesterol-free. Trends also indicate that the popularity of ethnic sauces continues as all ethnic categories grew last year. A combined average of Oriental, Mexican, and Italian sauces grew 15 percent in 1989, reports the Specialty Food Tracking Index (Florham Park, NJ). The runaway winner in this category for 1989 is the low/reduced calorie dressing segment with $252 million in sales, which reflects a whopping 23 percent increase over 1988 figures. Pourable dressings maintained their top slot with $757 million in sales.

[illegible] SHELF-STABLE FOODS

Trends and forecasts: canned foods (in millions of dollars)

	1988[1]	1989[1]	1990[2]	Percent change 1988-89	Percent change 1989-90
Industry data:					
Value of shipments	25,403	28,305	–	11.4	–
Value of shipments (1987$)	24,252	25,101	25,347	3.5	1.0
Product data:					
Value of shipments	24,548	27,427	–	11.7	–
Value of shipments (1987$)	23,445	24,307	24,526	3.7	0.9

[1]Estimated; [2]Forecast.

Source: U.S Department of Commerce; 1990 U.S. Industrial Outlook.

PROGRESSO TO:GO
Spaghetti with meat sauce
Pasta Primavera with Red Sauce
Pasta Salad Vinaigrette
Savory Turkey with Vegetables
Glazed White Meat Chicken
Cheese Tortellini Salad

The microwaveable, shelf stable food sector continues to expand as the push by consumers for convenience continues. (Source: Pet, Incorporated.)

The shelf stable market continues to march forward in the food industry as the value of production of canned fruits, vegetables, and processed food specialties grew 11.4 percent to $28.3 billion in 1989, reports the Department of Commerce in the *1990 U.S. Industrial Outlook*. In constant dollars, shipments of these products increased 3.5 percent. Areas experiencing the most significant growth included baby food, tomato products and other sauces, salad dressings, dried fruits and soups, and aseptically packaged foods. The popularity of basic canned fruits and vegetables, however, continued to decline as consumers' preference for both fresh and frozen goods increased.

The Department of Commerce reports that per capita consumption of canned fruits declined from 22 percent of total fruit consumption during the 1975-79 period to 16 percent during the 1985-88 period; fresh fruit consumption increased from 65 percent to 70 percent during the same time periods. Per capita consumption of vegetables followed a similar pattern during this same time frame. Canned vegetables declined from 50 percent to 44 percent, while consumption of fresh vegetables rose from 42 percent to 48 percent.

The Commerce Department reports the sales volume for baby food increased almost five percent over 1988. Companies in this sector will be competing for the share of the growing infant population, introducing new products which feature low salt and/or no sugar added preparations.

The convenience push by consumers is on and unquestionably shows in sales of microwaveable, shelf stable foods in plastic packaging. And those who place convenience at the top of their list in meal purchases are willing to pay premium prices for it, according to the business research firm FIND/SVP (New York).

A recent study by FIND/SVP predicts consumer demand for microwave food convenience will sustain a compound annual growth rate of nine percent between 1989 and 1994, to bring the microwaveable foods market from $2.5 billion in 1989 to $3.9 billion in 1994. These figures reflect sales of all microwaveable foods sold from grocery as well as non-grocery channels.

According to Peter Allen, FIND/SVP's Vice President, Market Research Reports, the study considered prepared entrees and popcorn to be the most dynamic segment among shelf stable microwaveable foods. But, Allen points out that "the segment's entree market is in a state of flux, as it begins to subdivide into adult/upscale and children's/downscale segments, with different formulations, packaging, and marketing for each product group."

For more information on this feature article, circle 351 *on the reader service card.* ▲

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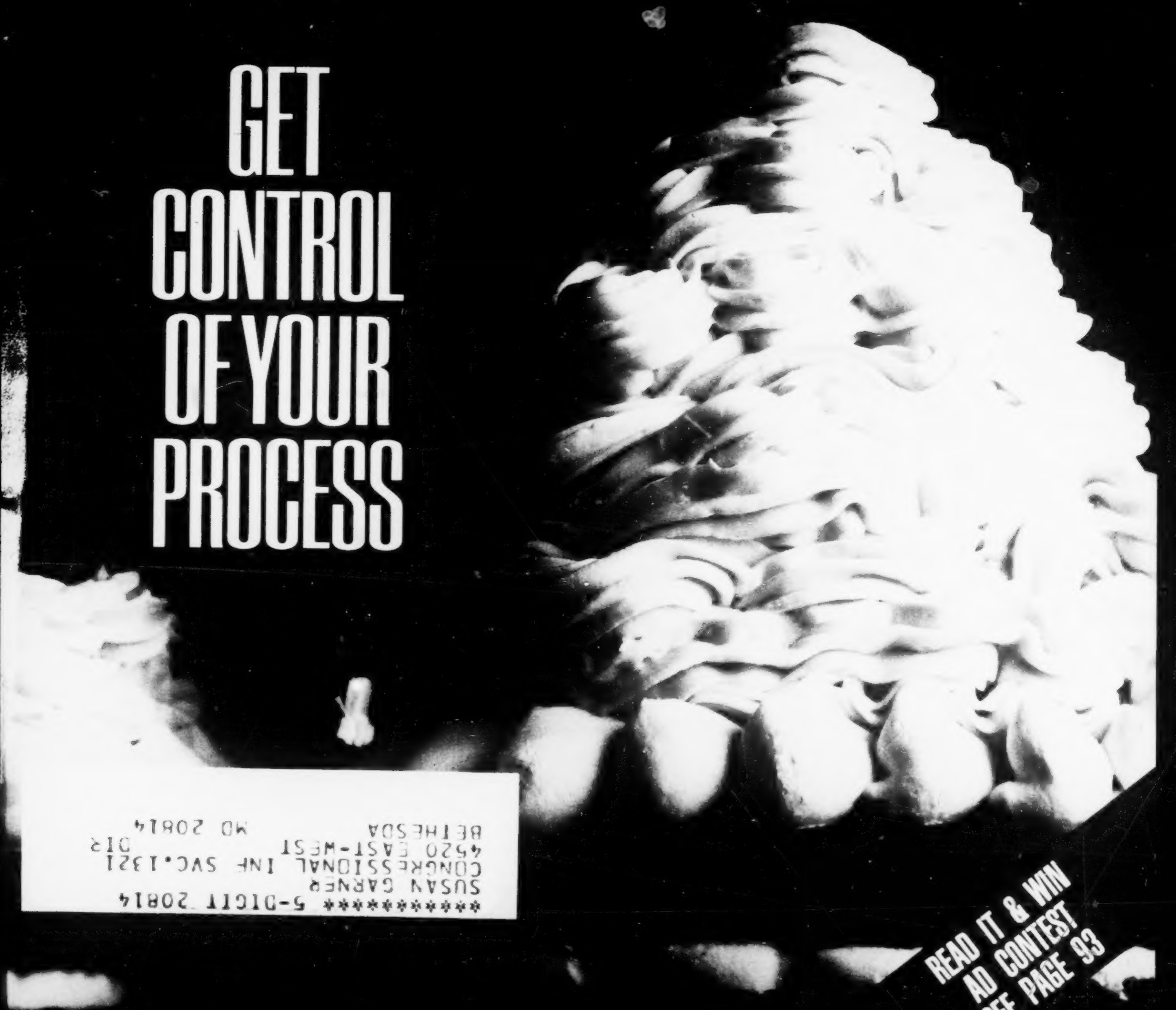
GET CONTROL OF YOUR PROCESS



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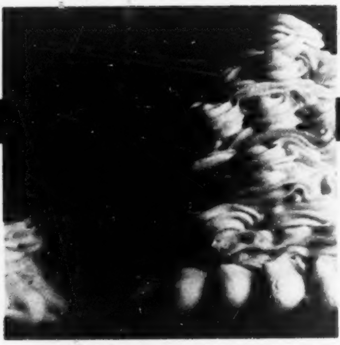
READ IT & WIN
AD CONTEST
SEE PAGE 93

FOOD ENGINEERING



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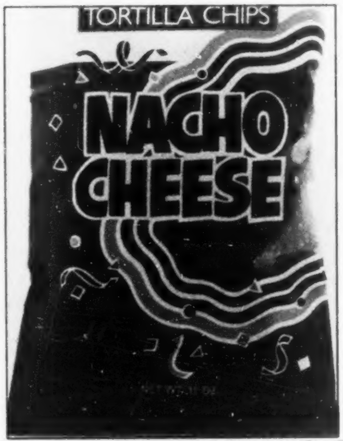

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JESSE H. NEAL
AWARD-WINNING
PUBLICATION

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INDUSTRY REPORT

Agreement on food signed with Soviets

U.S. Department of Commerce Secretary Robert Mosbacher signed an agreement early in June to promote trade between the U.S. and U.S.S.R. in the area of food processing technology.

The agreement creates a team chaired by the Commerce Dept. and the Soviet State Commission on Food and Procurement and includes members of American food processing companies, and representatives from the U.S. and Soviet government. Through the accord, American companies will learn more about the manufacturing needs of Soviet companies and of the possibilities of joint ventures.

A number of hurdles make trade with the Soviets difficult. The ruble has no value outside of the Soviet Union. Telephone lines and computer connections are primitive or nonexistent in some areas. Only large companies have enough capital to gamble in this environment. However, President Mikail Gorbachev has made it clear that the Soviets will only deal with those companies accepting the Soviet challenge now, not in several years.

Vladilen Nikitin, whose position in the Soviet Union is equivalent to our Secretary of Agriculture, signed the accord, saying it was a small step, but that "everything starts with a small step." The agreement concluded a three-day conference sponsored by the Food Processing Machinery & Supplies Association and the National Food Processors Association.

Dairy processors turn conservative

U.S. dairy processors have hedged their bets this year by foreseeing a planned total sales growth of just three to four percent, compared to last year's forecast of five to six percent. However, these figures gathered by the Dairy and Food Industries Supply Association's (DFISA) 1990 Capital Equipment and Supplies Survey were more optimistic than the U.S. Department of Commerce dairy growth rate forecast of 3.3 percent last year. Approximately 24 percent of the 2,138 dairy processors in the U.S. and Canada responded to DFISA's survey.

Top concerns of dairy processors

Dairy processor concerns	Percentage response	
	1989	1990
Fat substitutes	4	35
Packaging	33	16
Quality	50	60
Fed./state regulations	8	21
Total costs	81	71

Source: DFISA.

Total costs, quality and fat substitutes were top processor concerns for 1990.

This year, 35 percent of the processors said reduced-fat products, fat substitutes, new sweeteners, cholesterol and consumer health issues were top concerns. This represented a break with previous years, when packaging had commanded 33 percent interest in 1989 to only 16 percent this year.

Raw milk supply shortages and increased costs were top economic worries, followed closely by the nation's economy. This represented a drop of interest in cost margin pressures and rising equipment/product costs, which had drawn the concern of two-thirds of the respondents in 1989. This year, cost margin pressures drew ten percent interest and rising costs, six percent.

Sixty percent of the respondents felt that greater emphasis must be placed on organoleptical quality (taste and texture), higher standards, increased customer awareness and safer quality in products, up from 50 percent in 1989. As in previous years, processors regard customer service and centralized distribution as important check marks in their equipment buying decisions. Non-DFISA members may purchase the survey for $50 by contacting DFISA at (301) 984-1444.

Sara Lee closes Deerfield plant

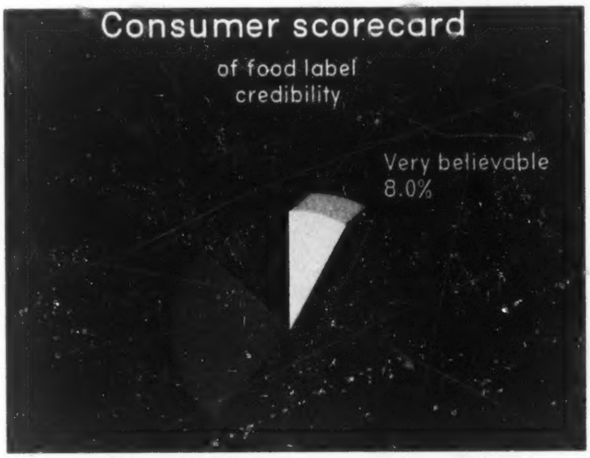
Sara Lee Bakery announced plans to close its 26-year old production facility in Deerfield, IL by March 1, 1991. Headquarters, research and development and technical services will remain in the Chicago area. The Deerfield plant currently employs 500 people. In addition to the plant closing, 100 administrative employees will be laid off.

Consumers eye labels with skepticism

When P.T. Barnum said there's a sucker born every minute, he certainly wasn't referring to today's consumer. In a recent study completed by the Food Marketing Institute (FMI), only eight percent of supermarket shoppers said manufacturer claims were very believable and 53 percent said they were somewhat believable.

When asked the reason for their skepticism, 61 percent said ads don't tell the whole story; 49 percent said **statements are not always truthful;** *and 26 percent dismissed statements as being mere gimmicks.*

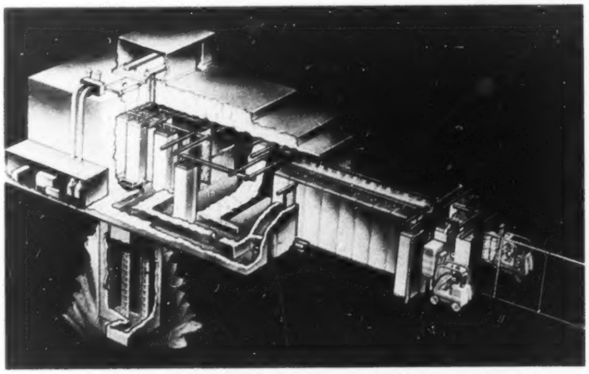
"With these questions in their minds, shoppers are looking to the government to make sure claims on food packages are accurate," said Timothy Hammonds, senior vice president of FMI, as he addressed attendees of FMI's annual meeting in Chicago. He reported that eight in ten shoppers are confident in the safety of the food supply, up from six in ten after the Alar and Chilean grape scares.



Consumers gave food labels low marks for credibility according to an FMI study. (Source: FMI.)

FDA clears irradiation

The Food and Drug Administration (FDA) has approved the use of irradiation to control Salmonella *and other illness-causing bacteria in chicken, turkey and other poultry. Although irradiation is a promising technology, public opposition will probably prevent its advantages from ever being realized in the U.S. Although there are no official figures for the outbreaks of foodborne diseases, the FDA estimates that almost* **every American suffers a foodborne illness** *every year or two. Such episodes can range from a simple stomachache to incapacitating illnesses that occasionally result in death. The FDA also approved of gamma radiation, electron radiation and x-ray treatments of poultry, including mechanically-deboned poultry. For more information on irradiation, see page 84.*



Public opposition in the U.S. will probably prevent the use of irradiators, such as this one, that can irradiate pallets of food. (Source: Nordion International Inc., Ontario.)

Negotiations break down between DFISA & IDFA

Negotiations to form a joint show have broken down between the Dairy and Food Industries Supply Association, Inc. (DFISA) and International Dairy Foods Association (IDFA). DFISA said it denied IDFA's request for half the net revenues from a jointly-sponsored Food & Dairy EXPO. DFISA based its refusal on the basis that close to 60 percent of its membership is comprised of companies whose primary business is food products other than dairy and that the strictly dairy IDFA is not entitled to 50 percent.

However, DFISA has offered guaranteed funds based on net square feet of exhibit space sold (see April FE*, page 15). The IDFA includes the International Ice Cream Association, Milk Industry Foundation, National Cheese Institute and American Butter Institute.*

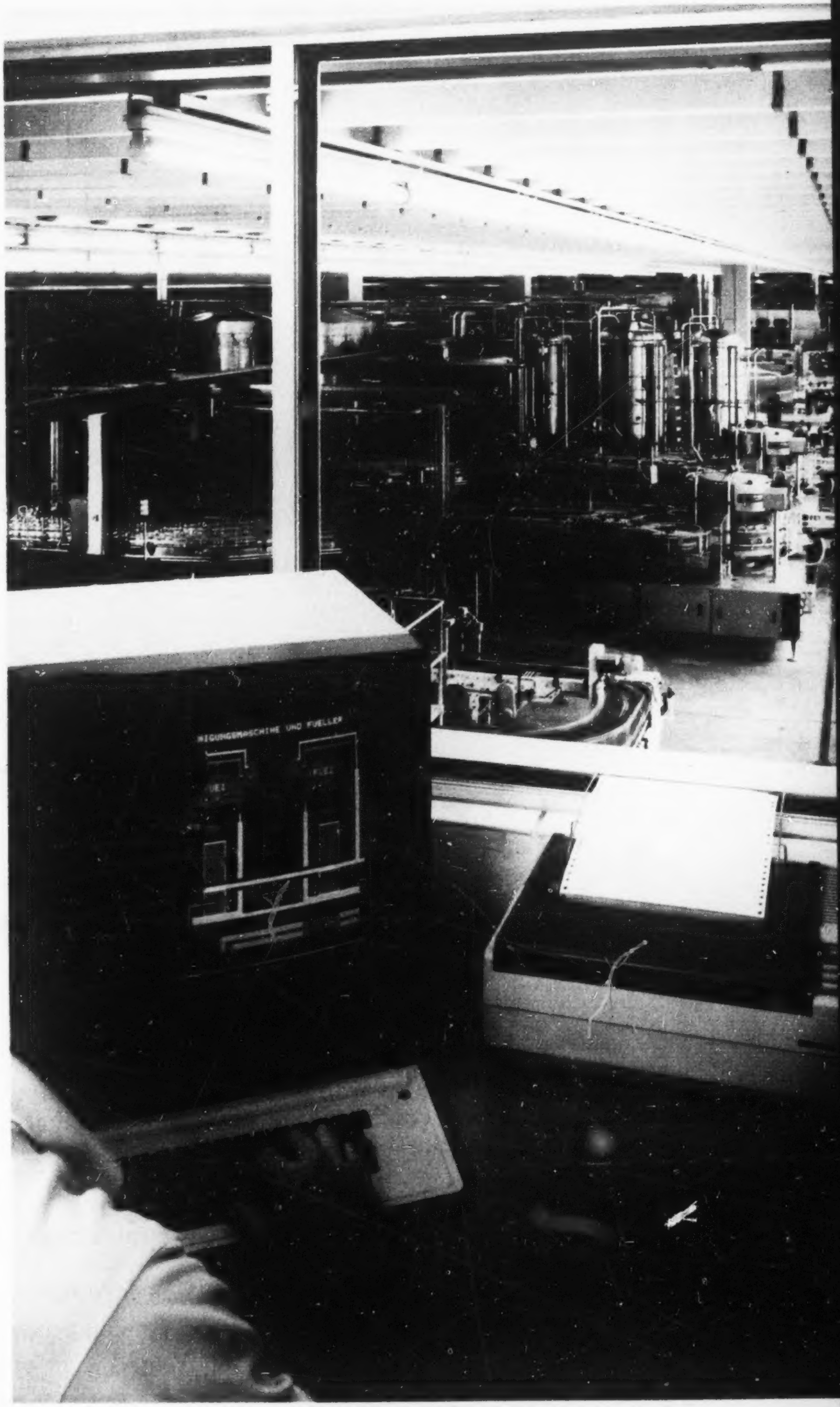
GETTING CONTROL OF YOUR PROCESS

Process control, without a doubt, continues to gain in importance in the food industry. Many talk automation but fewer actually implement it. What is the current state of affairs in process control?

MARGIE J. RUSSELL
TECHNICAL EDITOR

The new flavor on that snack product did well in test markets and quickly went to national distribution. And now, it is doing so well that your plant just got flooded for an immedi-

Control systems continue to show a significant return on investment.



(Source: Siemens Corporation.)

ate 10,000 cases in various sizes on a processing line that was not made to handle such numbers. Projections indicate the orders will continue.

It is time for panic?

No, not yet.

Even though it will be difficult—overtime, strained machines and strained employees, more raw materials—the orders will be filled. But, these and future orders might be completed a little easier with the help of process automation, which allows for expansion and less downtime. Process automation allows for flexibility as well, for who knows when a new flavor will be introduced and supersede the former one?

For many food plants, though, this scenario occurs many times with many different products. Historically, the food industry has always been the most difficult of the process industries to automate, but is this because it has become its own worst enemy?

"When you contrast food to other process industries, food tends to lag behind these other industries five to 10 years," explains Richard D. Dunbar, Market Manager, Food and Consumer Goods, Honeywell Inc., Phoenix, AZ. "There is a tremendous drive now to catch up and take advantage of this new technology."

In general, Dunbar points out, there are two types or classes of food companies using automation: those that have done it successfully (big players like Kraft/General Foods) and smaller companies that are struggling with it. But, these smaller companies often see improvement in quantum

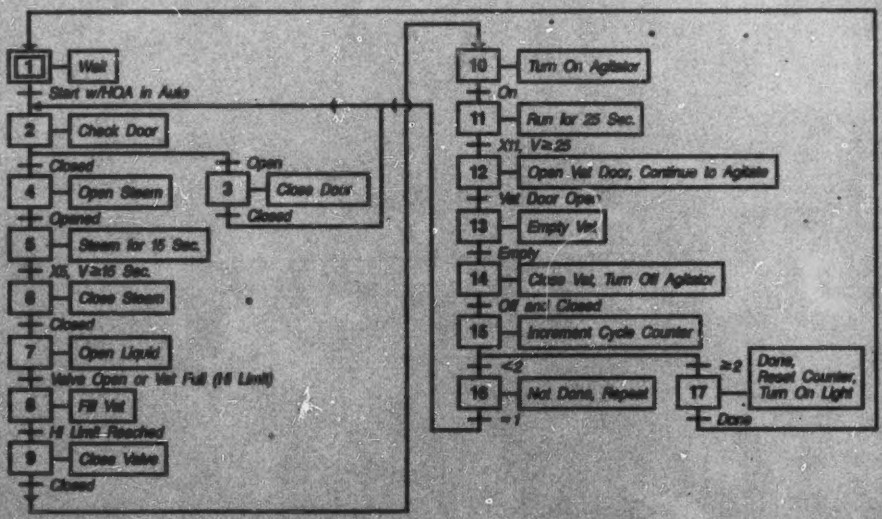
Improving efficiency with GRAFCET

Since its introduction, the programmable controller (PLC) has become the primary device for providing the control necessary to automate industrial processes. You could then infer that if a system is able to run automatically, it must have a definable, repeatable sequence.

With the traditional tools available to program a PLC or a micro-PLC, sequences must be implemented using either ladder diagram programming, boolean statements, or a "higher level" statement language. In any of these languages, creating a sequence can involve extensive interlocking logic, usually with internal control relays or bits. The resulting program can be difficult to create, troubleshoot, or modify.

Introduced by Telemecanique for its PLCs in 1978, GRAFCET is a method of charting a sequential operation. GRAFCET is a very simple representation of steps and transitions which control a sequence of events. A step, represented by a square box, means an action is to be taken: a motor is turned on or a valve is closed. A transition, represented by a short horizontal line, defines those conditions which must be met in order to move from one step to the next.

Clean in Place GRAFCET Chart


1
Wait
Start w/HOA in Auto
2
Check Door
Closed
Open
3
Close Door
Closed
4
Open Steam
Opened
5
Steam for 15 Sec.
X5, V≥15 Sec.
6
Close Steam
Closed
7
Open Liquid
Valve Open or Vat Full (Hi Limit)
8
Fill Vat
Hi Limit Reached
9
Close Valve
Closed
10
Turn On Agitator
On
11
Run for 25 Sec.
X11, V≥25
12
Open Vat Door, Continue to Agitate
Vat Door Open
13
Empty Vat
Empty
14
Close Vat, Turn Off Agitator
Off and Closed
15
Increment Cycle Counter
<2
≥2
16
Not Done, Repeat
=1
17
Done, Reset Counter, Turn On Light
Done

An initial step is represented by a double concentric box. Each GRAFCET chart must have an initial step. A large sequential control operation will have several GRAFCET charts, and each chart has an initial step.

A step in a GRAFCET chart is followed by a transition, followed by another step, another transition, another step and so forth as the sequence progresses. Directed links, shown as horizontal and vertical lines, are used to connect the steps and transitions. These define the sequential relationship of the steps and transitions.

A common operation in the food industry is cleaning mixing vats; the accompanying figure depicts a clean-in-place operation using a GRAFCET chart.

The process starts with the initial step labeled as WAIT. This step is an active step waiting for the start conditions to be satjumps when the control systems get the kinks out.

Many times, too, the implementation of automation in a facility depends on the types of products that are being produced rather than the size of the company. Those companies producing products in changing market conditions are able to use automation more effectively than those producing institutional-type products such as oils and flours. Companies with market-driven products see the most benefit from automation because they need flexibility. "Flexibility is the key for these flexible-type foods," says Dunbar. "However, stable-type food producers sometimes ignore the benefits of automation. They feel they know where their costs are and don't need it. What they don't understand is that improved control can lower their costs."

Total sales of automation equipment purchased for use in the food industry amounted to about $340 million in 1989, according to Andy Chatha of Automation Research Corporation (ARC), Medfield, MA. Programmable logic controllers (PLCs) alone accounted for almost $100 million of this total and are proving to be the most popular piece of automation equipment for the food industry. Batch-type systems which are only used for batch process control and include personal computers (PCs) and single loop controllers, outsold all categories with $160 million. Distributed control systems (DCSs) netted about $80 million in sales. Leading the way in this category is Fisher

---

isfied. The transition from step 1 to step 2 is awaiting the start button and the H-O-A switch to be placed in AUTO.

In step 2, the process waits for the vat door status. If the transition from step 2 to 4 is satisfied, the door is closed. Once the door is closed, the sequence advances to step 4. This is accomplished using ladder logic which references the GRAFCET chart.

GRAFCET does not eliminate ladder logic; it enables ladder logic to be used in its most effective form. GRAFCET defines the sequence and thus the interlocking that would have been done in ladder logic.

Transitions are defined by "zooming" in or windowing into a transition. The logic is then entered in ladder diagram or a "higher level" statement language. In GRAFCET, only an active step and its immediate downstream transitions are scanned.

Within the TSX 7 programmable controller, the logic is divided into three sections called the pre-processing, sequential processing, and post-processing. The sequential processing is where the GRAFCET charts reside. When the CPU scans the logic, it scans the pre-processing first, then the sequential processing and finally the post-processing.

Actions can be defined within the step or in the post-processing; the preferred method is to define them in the post-processing. Each step has a *bit* associated with it. For example, when step 1 is active, bit X1 = 1. Actions can also increment a counter such as is required in step 15 to count cycles. This could be accomplished by having bit X15 increment a counter. The transition from step 15 to step 16 or step 17 tests the counter value.

However, given the way GRAFCET executes, many times the question is raised on how emergency stops are handled. If a PLC only allows the program to be written in GRAFCET with no other provisions, then an exception condition would have to be incorporated into each transition. This would require a lot of redundant programming. Telemecanique solved the problem much easier.

The pre-processing is logic that has an effect on the GRAFCET chart. In an emergency condition, it may be necessary to freeze the GRAFCET chart and disable all outputs. Within the TSX 7 controller there are system bits for performing this function. The logic of when to do it is written into the pre-processing as a simple combinational ladder statement. All of the pre-processing logic is scanned in each scan. As such, the emergency condition will be seen regardless of which step is active in the sequential logic.

In addition, GRAFCET has the ability to combine a large number of different sequences and coordinate them simultaneously. Simultaneous sequences are divided into the simultaneous activation of multiple sequences (divergence) and the simultaneous de-activation of multiple sequences (convergence).

Because of these characteristics, it has become easy to troubleshoot using a GRAFCET chart. Troubleshooting now involves: 1) when the process stops, check which steps are active; and 2) check the transition below each active step. The problem will be in the transition.

Why is this so effective? If a GRAFCET chart stops, it is only because a transition has not been satisfied. Now instead of searching through rungs of ladder logic, the program is self-diagnosing. When downtime can cost thousands of dollars per hour, having a troubleshooting tool like this can easily save the cost of the system.

Donald Helmey, Product Manager, Electronic Dialogue, Telemecanique Inc., Westminster, MD

[illegible]

Type	'89 Dollars		'94 Dollars		AGR*
Batching systems	23.0	14.5%	25.8	11.3%	2.3%
DCSs	39.5	24.9%	56.6	24.8%	7.5%
PLCs	50.2	31.7%	84.4	37.0%	10.9%
PCs	22.7	14.3%	27.3	12.0%	3.8%
Workstations	9.4	5.9%	15.1	6.6%	10.1%
Minicomputers	13.9	8.7%	18.9	8.3%	6.4%
Total	158.6	100.0%	228.1	100.0%	7.5%

Source: Automation Research Corporation. *Annual growth rate

Many small, integrated control systems are available to the industry which perform vital functions such as trending, reporting, and batch management. (Source: Honeywell Inc.)

Controls (Austin, TX) whose systems are primarily purchased for batch applications, followed by Bailey Controls (Wickliffe, OH), holding on to a second place standing for food industry sales in 1989. Capturing an impressive third place was Taylor Systems/ABB Process Automation, Inc. (Rochester, NY) who has been gobbling up a significant part of automation sales in the food industry with its *Taylor MOD 300* system. (See chart.)

When to automate

Many times in the food industry, it is no longer a question of "should we automate." It has become a question of "when can we do it and how are we going to do it."

"Automation is an ongoing process of change," explains James R. Pettigrew, President of Progressive Control Systems, Inc., Milford, OH, "and involves much more than putting a PLC on a machine. You must consider the *process* as well."

Pettigrew, a systems integrator, says the processing area lacks a lot of sophistication and technology. Many times, clients don't understand their process. He explained that smaller manufacturers go with packaging equipment that is automated because the packaging vendors are up with the latest in technology. This probably all started in order to eliminate giveaways on the packaging line and automation was found to be the key in preventing this by accurately maintaining target weights.

Implementing an automation strategy also requires a significant amount of development. It just does not happen overnight. Automation represents an aid and a solution for long term planning; it is not a quick fix. An automation strategy for a manufacturer must consider the needs of system expandability and system flexibility.

"There are still two main keys to putting in an automation project," says Honeywell's Dunbar. "The first is a commitment on the part of the food company to put the necessary resources behind the installation. The second involves the supplier. A company needs a supplier that is capable of providing equipment that is matched to the application."

Another important factor often overlooked when implementing an automation project is that everyone who should be involved in the project is involved. Needless to say, process engineers, systems integrators and the like are involved from the beginning but to get continuous improvement during the project, production personnel should also be included in the team effort since these are the individuals who will be working with the system day in and day out.

In any large undertaking, cost justification is always the final determining factor to the success of the project. Generally, the benefits of process automation outweigh the costs of the equipment and systems. Automation has been found to be particularly positive for the long term in a processor's strategy plan.

Interestingly enough, it is not just economics that is preventing further expansion of automation in the food industry. There is still a lot of resistance to new technology and any project team must get upper management to fully sponsor and back an automation project. And, there is another factor: fear. Jim Pettigrew says there is often a fear for change of technology and a fear for people's jobs. Some of the other fears listed by Pettigrew include: fear that only an engineer can run the line and control system after it is installed, operators cannot run the system in manual, and "comfortability" in a plant operation is lost during installation and replaced with an "out of control" feeling.

But, in spite of economics, difficult processes and fear, are we making any headway in automating the food industry? "Most definitely," says Rich Dunbar. "Processors have more market opportunities now and must take automation principles into consideration when they develop their long term strategies. They will need to exploit automation technologies in order to build and maintain their competitive advantage." ▲

What really constitutes state-of-the-art?

Why does the food industry seem to be lagging behind others in the area of controls? This is a frequently discussed topic among process and control engineers in the food industry. Quite often we attend meetings and seminars where we are exposed to new features and see examples that whet our appetites.

We return from these sessions with enthusiasm trying to find applications in our own operations to implement this new knowledge. Little or nothing happens. Next year, the cycle is repeated. Why? What's wrong?

I am not suggesting that there haven't been some *new* installations which have incorporated sophisticated controls. But how many significant retrofits have you been involved with, or are aware of? Are we being oversold by the controls manufacturers on the incremental benefits of their newer systems? I'd like to offer some thoughts on definitions, industry differences, consumer expectations, and hardware.

First, we need to differentiate between management information systems (MIS) that provide data on inventory, uptime, etc. and process control systems (PCS) focusing on temperature, pH, etc. Much hoopla about new control systems are, in fact, MIS not PCS.

Secondly, while some vendors would like us to believe that their successful implementations in other industries have a parallel for us, I find reality to be off in a side alley.

Similarities can be deceiving. Many foodstuffs are pumped through piping systems that might be mistaken for a petrochemical plant. And yes, a few formulated products, for example, frozen pizza, multi-component frozen entrees, move along an assembly line like a car. So what's the problem with us automating like them?

Since we are food processors, the problem is that we are selling TASTE, one of the most difficult attributes to measure. We therefore rely on many inferential measurements and taste panels. But I don't know how to put a taste panel's opinions into a controller.

We take recalls of our automobiles for granted. We return our cars to the dealer, have the repairs performed and then later, we often buy another model from that same manufacturer when the time comes to replace it. But recalling a food product is a different story. Several companies no longer exist as the result of a process control malfunction or monitoring oversight. We are expected to provide a much greater confidence level for the consumer and regulatory agencies.

Finally, without question, there already is plenty of technology in controllers. But controllers require two inputs, the setpoint and the measured signal, and sensors are still the weakest link in our efforts to further advance control systems in the food industry. Temperature and pH sensors are generally adequate; viscosity and moisture sensors somewhat trickier depending on the product; and in-line flavor and texture sensors virtually unavailable. We still need our master chefs and brewmasters in many applications.

Undoubtedly, we need more and better tools and techniques to turn much of our art into science. Therefore, if we agree on our definitions and acknowledge the consumer's higher expectations (and less forgiveness) in terms of trust, we need to put more pressure on the instrument suppliers to develop sensors that will give us the measurements we need for the control hardware that already exists. Much has been done, but much more remains to be done.

Stay tuned for more from Steven Chall, a process engineering specialist with CHALLengrs, a Minneapolis firm providing consulting and contract engineering services to the food industry. Starting in our August issue, Mr. Chall will become a regular columnist in FE's Processing and Control section. —Ed.

C2150 - 6

CHILTON'S AUGUST 1990

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FOOD ENGINEERING

ABOUT THE COVER

No wonder the American consumer is concerned about the safety of the food supply. A review of newspaper headlines during the past year alone suggests a state of crisis, whether the incidents reported were truly dangerous or not.

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SPECIAL EMPHASIS

PAGES 107 TO 110

GREAT!
FRUIT PUNCH
10-K
GREAT!
ORANGE
10-K

COLD FILL PET: **PAGE 50**

ENGINEERED FOODS

26 Quality Becomes A Business Function
Quality is now the responsibility of all employees at Ocean Spray, reducing QC plant inspectors.

30 Panel Quantifies Elements of Flavors
Provesta's in-house descriptive flavor analysis panel is an integral part of the company's new food technology center.

32 Marketplace—Chilled Foods
This year's restaurant show featured *sous vide* and healthy products as well as chilled foods.

33 AOAC Acts on Food Microbial Study
New system for identifying *salmonella, E. coli* and other enteic genera received interim approval from AOAC.

FOOD PACKAGING

48 Pack Alimentaire in San Francisco
The environment, chilled foods, microwave technology, and interactive packaging were on the menu at the fourth annual conference.

50 New Bottle for Isotonic Drinks
Sewell Plastics, Inc. introduced the first cold-fill polyethylene terephthalate (PET) bottle for use in the isotonic drink market.

52 Recycling Facility Dedicated
A joint venture is expected to be one of the largest and most comprehensive plastic recycling systems in the U.S.

57 Trendwatch—Environmental-Friendly
Is your package "umwelt freundlich"? In Europe, it had better be.

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63 Food Safety: Realities and Risks
Consumers perceive "chemicals" as the greatest threat, despite overwhelming evidence to the contrary.

72 Ingredient Trends for the '90s
Healthy foods with less fat were prevalent at this year's IFT convention.

97 Biosensors: Next-generation QC
Biosensors open up whole new realms for monitoring the manufacture of products.

103 New *Sous Vide* Plant in Operation
Computerized cookers, extensive bacteriology research and trained personnel are key to this operation.

107 Regulatory Concerns with Flavors
Complying with the USDA's rule requiring companies to label "flavorings" is a challenge for the industry.

PROCESSING & CONTROL

114 Microwave Sterilization Heats Up
"Hybrid" waveguide design is the key to continuous sterilization of tray-packed meals.

116 Freezers Recycle Gas Exhaust, Cut Costs
Seafood company cuts cost by using liquid nitrogen freezing tunnels to recycle nitrogen gas exhaust.

118 Aseptic Process Provides Options
Microwaveable refrigerated soups are aseptically processed in a batch-continuous system.

122 Online—Team Play
Do we include those who know the intricacies of plant operations when implementing change?

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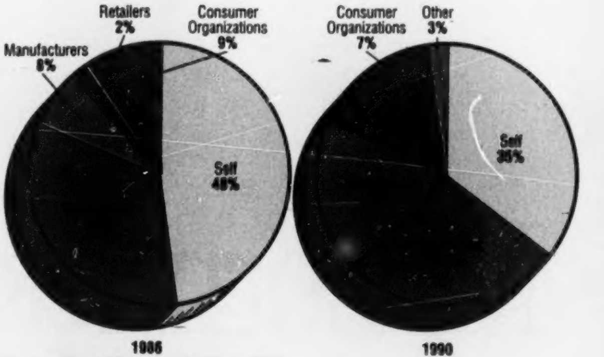
Shoppers pass the buck to manufacturers

American consumers are taking less responsibility for judging whether food is safe or not and are shifting responsibility to food manufacturers. In 1986, 48 percent of consumers placed responsibility for food safety with themselves, while that figure dropped to 35 percent in 1990. In 1985, only eight percent expected manufacturers to be responsible while that figure grew to 19 percent in 1990.

Who's Held Responsible for Food Safety

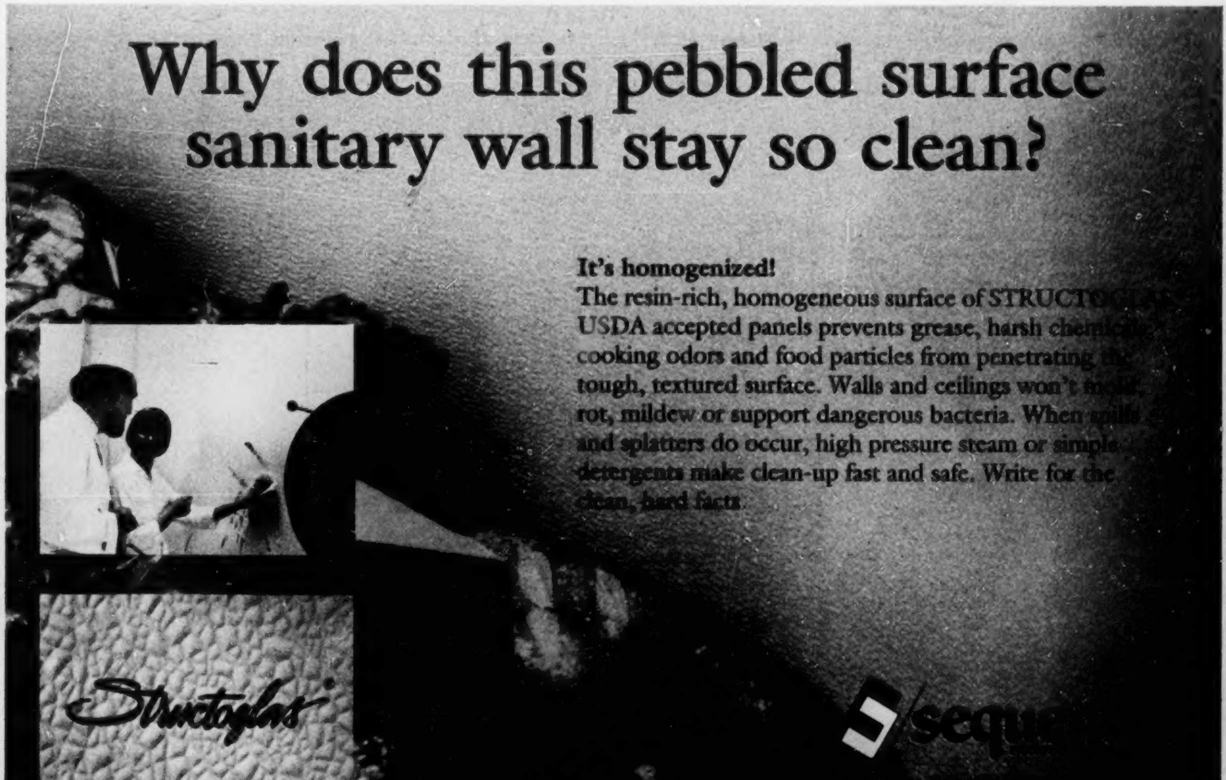


Source: Food Marketing Institute (FMI).

Consumers expect manufacturers to take a greater role in insuring food safety.

While shoppers placed less responsibility with the government during the four year period, they did mention things they felt the government should be doing to insure the safety of the food supply. Approximately 42 percent would like to see more safety inspections, 31 percent would like to see better enforcement of current standards, 16 percent want government standards for food manufacturers, and 11 percent want tougher guidelines for the use of pesticides and hormones.

Almost half of the shoppers surveyed said they sought information on food safety during the past year. This figure represents an increase of nine points from 37 percent in 1989.



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Circle 15 or see FEM, p. 346

C2150-6

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FOOD ENGINEERING

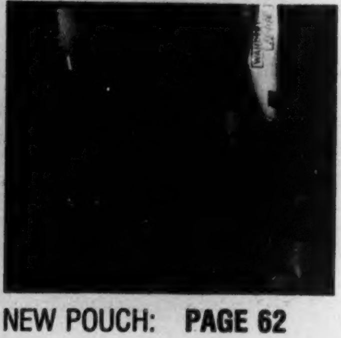
ABOUT THE COVER

Gone are the days when people consumed foods without regard to what was in them. Food companies are investing more time and money in food labs with state-of-the-art analytical equipment to better serve consumers and to provide a better bottom line. Photo courtesy of Hewlett-Packard.

PAGES 81 TO 99

SPECIAL EMPHASIS

PAGES 115 TO 122



NEW POUCH: **PAGE 62**

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30 Bioscience—Third Generation of Food
The impact of bioscience has been seen in raw materials, ingredients and finished food products.

32 No-fat Dairy Dessert Launched
Royal Lites is the first national no-fat, no-cholesterol frozen dairy dessert.

37 Marketplace—Telemarketing of Clients
Telemarketing is providing accurate database information about food and beverage company customers and their competition.

40 Choices—Nutrition and the Environment
This new motivator is changing consumer criteria for selecting foods in the marketplace.

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58 Protection for Oxygen-sensitive Products
Advanced technologies of evacuation and gas flushing made their debut at Interpack.

60 'Susceptor-less' Microwave Technology
The Micro Match system redirects microwave energy in packaging and improves heat uniformity.

62 Stand-up Pouch Features Built-In Straw
High barrier stand-up pouches offer the ultimate in convenience for energy drinks.

66 Packaging Innovation Center Opened
International Paper's new $4 million state-of-the-art facility increases the company's ability to develop and test new packages.

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81 Food Labs of the Future

More flexible application software to deal with information generated, quality built into operating procedures and more specific detectors reducing the amount of sample preparation needed will be part of future food labs.

101 International Dairy Pre-show Report

The industry's only dairy-specific exhibition allows interaction between suppliers and colleagues.

107 Roundtable—Flexibility for the Future

Food Engineering got together key people from major food companies and universities to discuss the relation of technology to corporate competitiveness.

115 Sanitation Cleans Up its Image

Once regarded as a mop-up operation, sanitation is now recognized as essential to the company's bottom line.

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150 Nestle Pilots POMS at Coffee Plant

System serves as the missing link between process control and MIS.

152 Ripe Technology for Fruit

A pressurized evaporation cooling system used to ripen fruit cuts labor and energy costs.

154 New Salad Plant is Biggest in the South

Small regional processors can compete with the giants if they are equipped for refrigerated distribution.

156 Compact Evaporator Cuts Costs

A triple-effect falling-film evaporator scaled to low-volume production does the trick for Red Giant Foods.

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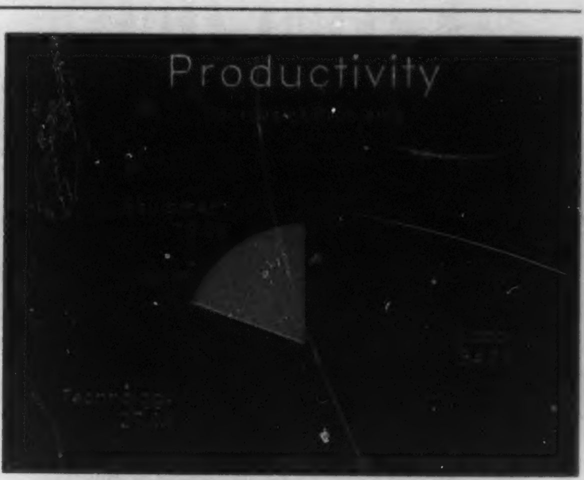
Management cites people as problem

While more than half the manufacturers in a national survey pointed to "people" as the underlying **productivity problem,** less than one quarter are willing to invest in "people" to solve the problem. Most, nearly 38 percent, cited investment in new plant or equipment as the single most important step their companies have taken in the past three years to improve productivity.

A telephone survey of 250 mid-sized manufacturers by Grant Thornton, an accounting and management consulting firm based in New York, found that productivity is a problem for close to 70 percent of all companies interviewed. "If the problem is indeed with people, then manufacturers may be applying the wrong solution," said Michael N. Cantwell, chairman of Grant Thornton's National Manufacturing Industry Committee. "Investing in faster production equipment, for example, may actually retard productivity if workers lack adequate skills, training or supervision."



More than half the respondents said labor was the source of problems in productivity. (Source: Grant Thornton.)

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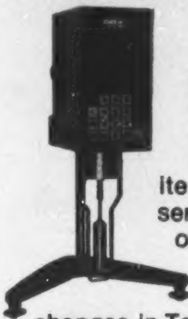

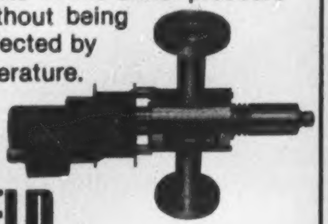

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Packaging engineers search for identity

Most packaging engineers developed their expertise on the job — only 20 percent were trained as packaging engineers and only 24 percent had a packaging science background. However, 77 percent of the respondents to a recent survey indicated that packaging engineering is a true engineering discipline, according to a survey conducted by J.C. Campbell & Associates of St. Louis and a doctoral candidate at the University of Missouri-Rolla.

When hiring entry-level personnel in packaging engineering, 36 percent of the packaging professionals surveyed preferred applicants with a packaging engineering education and 28 percent, a general engineering degree. Respondents also said that packaging educational **programs should include more technically-oriented packaging courses,** more personal communication courses and more engineering.

The study endorsed the creation of a formal, accredited package engineering degree program to steer top engineering students to the profession.

One of the survey's participants effectively described a packaging engineer as someone who knows "more about engineering than business majors, more about business than engineering majors and more about packaging than any major."

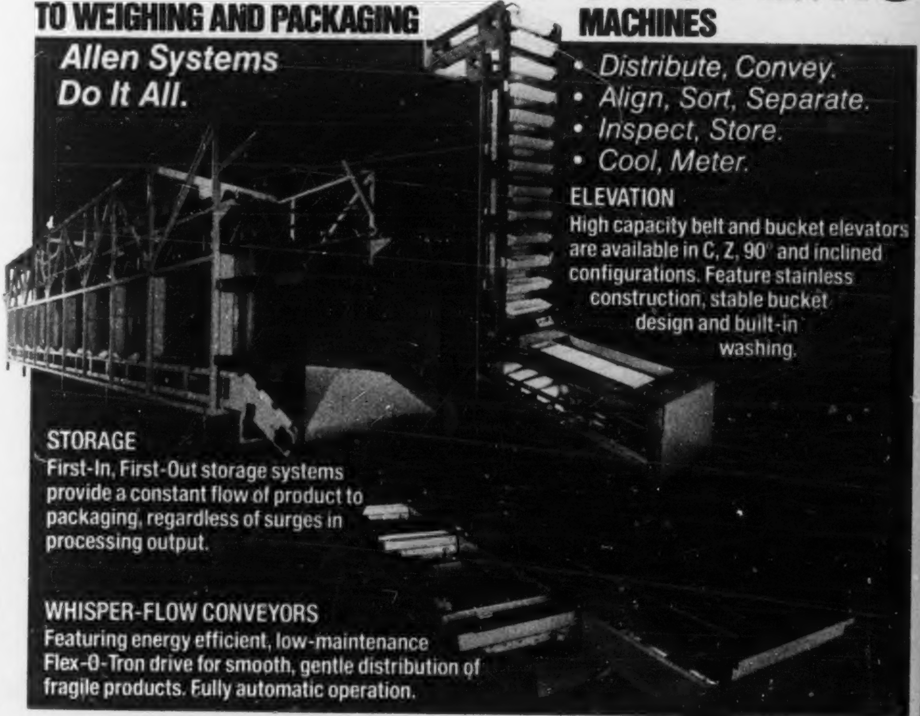
Packaging engineers' recommendations for ideal professional preparation

Packaging	50%
Personal communication	37%
Engineering	29%
Sales/marketing	18%
Management	17%

Total reflects multiple responses.

Source: J.C. Campbell & Associates.

Packaging engineers listed their recommendations for ideal entry-level professional preparation.



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FOOD ENGINEERING

ABOUT THE COVER

There are many types of processing techniques in the food industry but some are more "leading edge" than others. This month *Food Engineering* takes a look at six emerging technologies and their effect on the industry.
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SPECIAL EMPHASIS

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ZIP-PAK
ZIP-PAK
CAL★PAK
CAL★PRUNE
Selected Dried
MIXED FRU
California Fruit

ZIP-PAK BAGS: **PAGE 58**

ENGINEERED FOODS

28 Genetically-Engineered Corn Plants
Research opens the door for genetically-engineered corn to pass pest- and disease-resistance to offspring.

30 Marketplace—Gourmet Coffee
Despite the moderate growth of regular coffee consumption, manufacturers are pumping up sales with many types of exotic, gourmet flavors.

37 Sensory Research for Custom Designs
Monell researchers are working to understand receptors in taste cells to custom-design flavors.

40 New Research on Anti-Carcinogen
Recent studies on CLA show that this anti-carcinogen is also a potent anti-oxidant.

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Easy-open gable-top cartons with spouts create new opportunities for barrier packaging.

56 Reducing Hazardous Compounds
Can end dryers with water-based sealing compounds can easily be retrofitted into already existing manufacturing lines.

58 Dried Fruit In Resealable Packaging
California Prunes are the first national brand of dried fruit in a ZIP-PAK bag.

65 Trendwatch—My Summer Vacation
By listening well, you can "see" and learn a lot in the world of packaging.

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77 Leading Edge of Processing Technology
As the industry enters a new decade, one of the most exciting features lies in the processing area as technologies emerge and mature.

93 New Directions in Heat Exchange
Ultrapasteurization extends beyond milk products. Food processors awaken to Cook/Chill in meeting the chilled-foods trend.

99 Packaging Buyers Survey
Demands for better barriers, the green revolution and challenges from foodservice don't stifle innovative ways of packaging food, according to *FE*'s annual survey.

107 Pack Expo Gears Up for Chicago
The numbers get higher every time—42,000+ attendees, 900+ exhibitors, 750,000+ square feet—as Pack Expo 90 takes over McCormick Place.

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116 Distributed Process Control
Distributed system allows incremental integration.

125 Direct-steam Injection for Cans, Bottles
System can cut energy costs by up to 28 percent compared to indirect heat exchangers.

128 Dairy Plant Cleans Wastewater
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U.S. companies win international acclaim

Three U.S. food products won recognition from an international panel of trade press editors who judged the products based on polls conducted with distributors and consumers. The Sial D Ór awards are presented on alternate years to the best products of 17 countries.

Denmark was the only other country to win three awards; the rest of the countries picked up either one or two. **Oscar Mayer Foods Corp.**, *Madison, WI won honors for its* Lunchables *packaged cold cuts, cheese and cracker combinations.*

Micro Cups *from* **George A. Hormel & Co.**, *Austin, MN was recognized for providing microwaveable meals on the run: twelve different shelf-stable entrees and seven different soups. St. Louis-based* **Anheuser-Busch, Inc.** *was honored for* Michelob Dry.

Oscar Mayer
Lunchables
Deluxe
Turkey & Ham
Oscar Mayer
Lunchables
Ham & Swiss

Oscar Mayer's Lunchables was one of the winners of the international Sial D Ór awards.

Western products are a hit in Singapore

Singapore is a thriving market that is willing to try U.S. food products, once they are familiar with them, according to the U.S. Department of Agriculture (USDA) Foreign Agricultural Service.

The Southeast Asian nation **imports $3.5 billion** *annually in agricultural products which includes U.S. meats, poultry, apples, oranges and grapes. Pears are being introduced, but Singaporeans are used to local varieties and the USDA suggests a consumer education program is needed. As in the U.S., more women in Singapore are entering the work force outside of the home and there is an increased demand for high-quality microwaveable and convenience foods.*

Packaging equipment exports show strong growth

U.S. sales of packaging equipment ***jumped almost 27 percent*** *from 1988 to more than $500 million 1989, according to the U.S. Department of Commerce (DOC). At the same time, processing equipment exports dropped 19 percent to $412.4 million in 1989, the DOC reported. The top buyers of U.S.-produced packaging and processing equipment include: Canada, Mexico, the United Kingdom (UK), Japan and South Korea.*

Meanwhile, processing equipment imports increased a little over one percent to $327.7 million while packaging equipment imports dropped nearly six percent to almost $597 million. The U.S. buys most of its food processing equipment from West Germany, Japan, Italy, the Netherlands and the UK.

Food processing/packaging equipment imports, exports ($ million)

Machinery	1988	1989	% change
Processing equipment imports	323.4	327.7	+ 1.3
Packaging equipment imports	634.4	596.9	- 5.9
Processing equipment exports	509.1	412.4	-19.0
Packaging equipment exports	395.0	500.4	+ 26.7

Source: U.S. Department of Commerce.

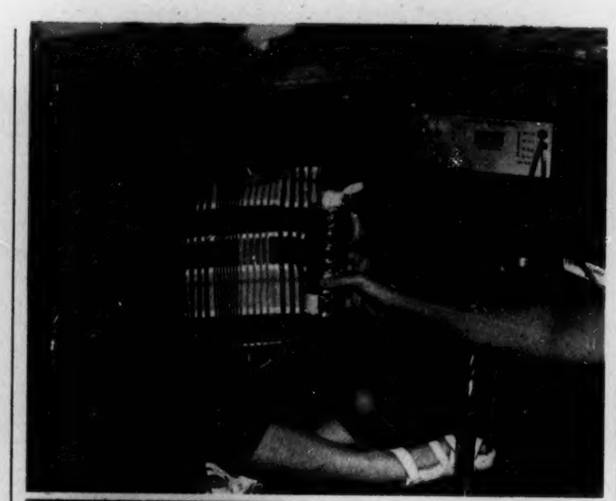
Packaging equipment exports jumped over 25 percent of 1988's sales in 1989.

our customer's expectations [needs and wants] will require changes and/or improvements to the 'system' with which we work. We need to first determine what our customer's expectations are. Then we need to commit to eliminating the barriers, solving the problems, making the improvements or initiating the changes that allow us to met the expectations. The process is continual because (1) the goal is 100 percent conformance [not 99 percent] and (2) customer expectations will change over time."

Huff pointed out that unless people strive for 100 percent conformance or zero defects, they will never achieve it. While errors occur, it is necessary to identify them and improve the system to eliminate the cause.

McCormick & Co., Inc., 230 Schilling Circle, Hunt Valley, MD 21031
Circle 203

Monell Center pushes frontiers of taste and smell research



[redacted]

How our senses of taste and smell interact with flavors continues to baffle science. But, by understanding the workings of receptors in taste cells, compounds could be custom-designed to yield an endless variety of flavors. This is just one of the areas researchers study at the Monell Chemical Senses Center in Philadelphia.

On a recent visit by *FE* to Monell, Mark Friedman, assistant director and head of the nutrition program, discussed some of Monell's projects.

While we often take our senses of taste and smell for granted, they have a significant effect on our eating habits and the success or failure of a change in diet.

For example, individuals who must restrict their salt intake initially find it difficult to break the salt habit. The misery may not be worth it, because research shows that salt added during cooking or at the table equals less than ten percent of total salt intake.

In addition, physicians in the future may instead examine the individual's calcium intake since recent Monell research with rats suggests that a diet deficient in calcium might contribute to an increased desire for salt.

In one study of nonnutritive sweeteners, Monell found that people drinking large amounts of aspartame-flavored beverages successfully lost weight. However, chewing aspartame-flavored gum increases the appetite since the act of chewing stimulates digestive juices and expectations for food.

Everyone knows that people often are cautious about trying new foods. However, little is known about how to overcome an initially negative reception to an exotic dish. Monell researchers found that when people are informed in advance about a food's taste, they show greater willingness to try it. But providing nutritional information has no effect in winning a trial taste, even in the age of "nutritional consciousness." (However, the study subjects ranged in age from three to 22, a group not noted for its concern for nutrition. In the future, tests will use older subjects, said Monell researcher, Marcia Levin Pelchat.)

Besides trying to discover the secrets of the human appetite, Monell researchers are also trying to figure out how to fatten up catfish faster to increase productivity and reduce feed waste.

Monell attracts visiting scientists from all over the world, including the USSR, China, and Japan. And the center has trained more than 250 scientists.

Impact of fat substitutes in Europe will vary by country

Europe presents a smorgasboard of fat consumption and the potential success of fat substitute products will vary by nation, according to Experience, Inc., an international agribusiness consulting firm with offices in Minneapolis and Washington, DC, in conjunction with the Swiss consulting firm, Consultex of Geneva.

For example, daily per capita calorie consumption is over 3,800 in Ireland and less than 3,200 in Portugal. West Germany leads the rest of Europe in terms of fat consumption with per capita consumption of 80 pounds. German health officials have set goals to lower saturated fat conumption which many ermans seem to be following. Market share for ow-fat products increased from 4.1 percent n 1983 to 9.1 percent in 988, according to Expe-ience.

The United Kingdom's nnual per capita fat onsumption is 72 ounds and is taking a eating. About half of UK shoppers claim to atch labels for fat, sug-r and calorie content.

Meanwhile back in the USSR, fat consumption emains steady at 50 ounds per capita and hows no sign of abating. Other Eastern European ountries have a diet higher in fat than the USSR, at a per capita onsumption of 58 ounds. Along with the USSR, these countries re also unlikely markets for fat substitutes.

U.K.	72
France	60
West Germany	80
U.S.	75
U.S.S.R.	50
Eastern Europe	58
Japan	40

Source: Experience, Inc.

▲ **West Germany leads the world in fat consumption, followed closely by the US and UK.**

[illegible]

American Maize recently reported on the regulatory status of cyclodextrin. In the U.S., the company opened a master file for beta cyclodextrin with the FDA (master file #337). This was followed by a draft food additive petition, with formal filing to follow shortly. While new studies of the biochemistry and toxicology of beta cyclodextrin are required to obtain FDA approvals, summaries of earlier findings on the toxicology of cyclodextrins can be obtained from American Maize.

In France, beta cyclodextrins (obtained by the enzymatic process) have been approved by the Superior Council of Public Health of France, and the National Academy of Medicine. They may be used as a carrier for flavors.

In the Netherlands, beta cyclodextrin was declared to be an enzymatically modified starch. As such, it is permitted as a raw material for the preparation of foods.

The Food Administration of Denmark permits the application of cyclodextrin as a carrier material for flavor compounds. Approvals for various levels of beta cyclodextrin have also been reported in Luxembourg, Spain, Belgium and Germany.

In Japan, the cyclodextrins are listed as natural food additives and commercial applications within the Japanese food industry was initiated early in the 1980s.

A line of *Cavitron Cyclo-Dextrin* products is currently available for commercial sale from American Maize.

American Maize-Products Co., 1100 Indianapolis Blvd., Hammond, IN 46320 **Circle 207**

Improved spice technology to result from acquisition

German-based Fuchs GmbH acquired Baltimore Spice in late July. Lou Greis, president of Baltimore Spice, Owings Mills, MD, said he was pleased with the move since it will result in Baltimore Spice having access to Fuchs' proprietary microencapsulation process. While encapsulating oils derived from spices is nothing new, microencapsulation enrobes the spice itself as it is being ground. In addition, the process reduces bacteria levels without the need for chemical processing and shelf life is extended.

The appearance of the spice looks similar to conventionally-processed spices. Various types of coatings are used, Greis said, including maltodextrins. He also said the merger would allow the two companies to share markets and raw product sources.

Baltimore Spice, P.O. Box 5858, Baltimore, MD 21208 Circle 204

Enzyme modified cheese and dairy flavors

Enzyme modified cheese and dairy flavors are examples of the technological advances made to provide more natural flavors. Speaking at a conference on fat and cholesterol-reduced foods (co-sponsored by International Business Communications, South Natick, MA, and *Food Engineering*), Dr. Peter R. Freund, manager of product applications for Chr. Hansen's Laboratory, Inc., discussed the advances made in this area, and the wide range of products available.

Shown (on page 40) is an enzyme action scheme for flavor and textural development of aged cheddar cheese. Alternatives for the use of natural cheeses as flavors are: high flavor intensity natural cheeses; enzyme modified cheeses (EMCs); and natural flavors, explained Freund.

High flavor intensity natural cheese is tradi-

PACKAGING BUYERS SURVEY

PLASTICS STRETCH IN NEW DIRECTIONS

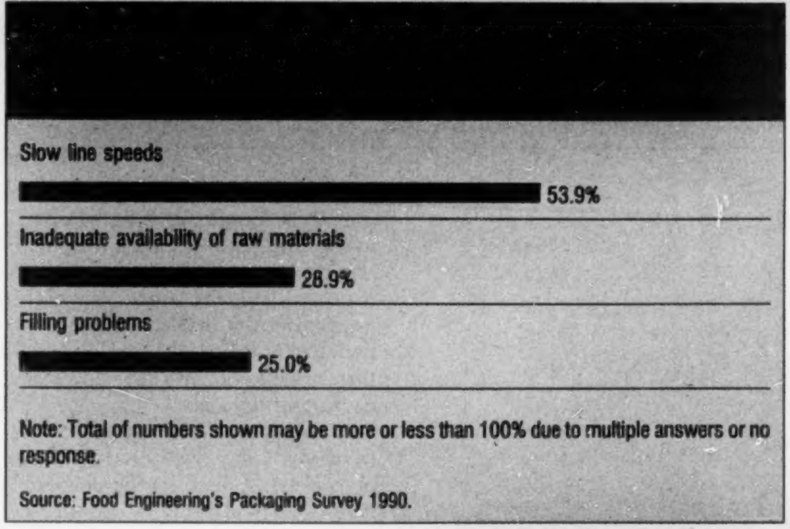
Demands for better barriers, the green revolution and challenges from foodservice don't stifle innovative ways of packaging food.

PATRICIA M. DILLON
SENIOR ASSOCIATE EDITOR

Results from *Food Engineering's* Annual Packaging Buyers Survey are in and for the fifth year in a row, the food industry is calling for better barrier plastics. Approximately 60 percent of the more than 500 members of the Executive Advisory Board voted barrier plastics most important as a packaging concern. Barrier films still have a long way to go to satisfy food processors. Requests included:

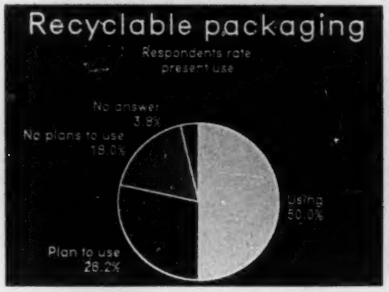
- "A plastic polymer, extrudable for films or rigid containers which is reusable or recyclable and has an oxygen and water barrier approaching glass. Polymer should also be resistant to heat deformation under retort conditions and of course, acceptable to the FDA."—a packaging consultant from the South.
- "High barrier, clear plastic material for bottles which could be used as a monolayer to make it easily recyclable. Oxygen and moisture barrier to equal three times that of polyethylene terephthalate (PET)."—lab manager at a major food processor.
- "Greater development of plastic containers that can take pressure and heat."—Midwest food processor.
- "Cost-effective fat barrier with better material toughness. Current polypropylene barrier is too brittle" and doesn't do the job.—president of Wisconsin food company.

As the preceding comments demonstrate, the desire for better plastic is coupled with environmentalism. Food manufacturers want packaging that withstands the rigors of process-



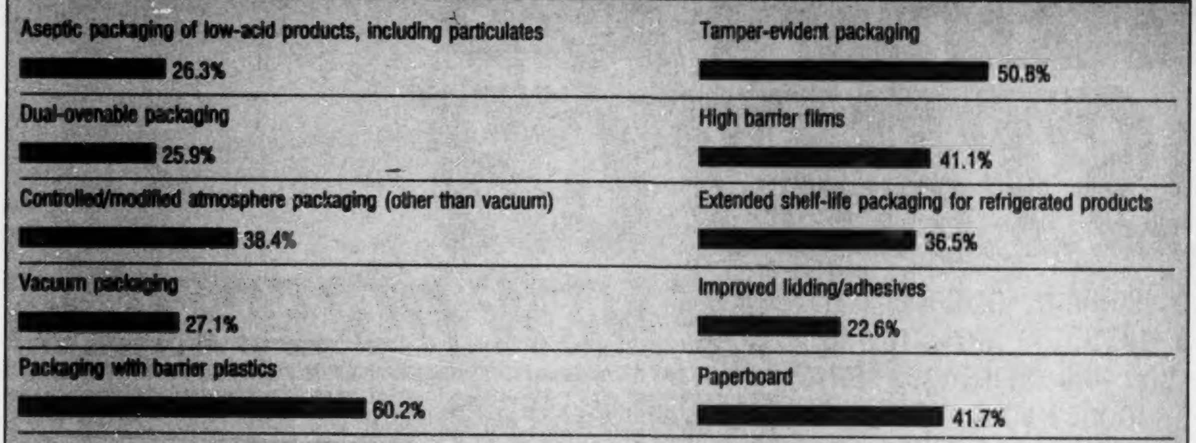
Note: Total of numbers shown may be more or less than 100% due to multiple answers or no response.

Source: Food Engineering's Packaging Survey 1990.



Important packaging areas

Respondents were asked to check the areas of food packaging likely to be of most importance [illegible] years.



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Source: Food Engineering's Packaging Survey 1990.

ing and distribution yet won't accumulate in America's landfills. From a marketing standpoint, it's smart to think green and panelists are increasingly calling for more recyclable packaging materials. Almost every panelist mentioned recyclability in the same breath with the rest of their packaging requests.

A tongue-in-cheek request isn't far from what the industry wants: "Barrier packaging material for perishable foods that will literally self-destruct within months of being removed from a refrigerated environment."

Our panelists reported that more of their customers are concerned with source reduction–cutting down on the amount of packaging at the source. Shrink-wrapped tray packs are alternatives to the typical cardboard case. While panelists want less material, they are not willing to sacrifice attractive graphics and container stability. Panelists feel containers can be made that are light-weight yet retain sidewall strength and offer acceptable "feel" to the consumer.

Only a few panelists feel biodegradability is a viable option. Perhaps because this solution is largely mythical since landfills don't offer exposure to the necessary sunlight and air needed to breakdown waste.

Foodservice challenges

Along with the green revolution, foodservice is making new demands on packaging. Last year, consumers spent $243.3 billion, almost 47 percent of their food dollars, on foodservice. And just over half of our respondents, 53.4 percent, say they package for food service. Product integrity and appearance were the most important customer requirements, beating factors such as convenience and cost. Meat, canned, and frozen food manufacturers had a slightly higher average in supplying foodservice.

A healthy 73.4 percent of the panelists confirmed that fresh prepared departments in supermarkets are creating a need for new packaging. "Containers in the fresh prepared departments definitely need more developments for less oxygen transport, for example, tighter seals with gas packaging," said a Wisconsin techni-

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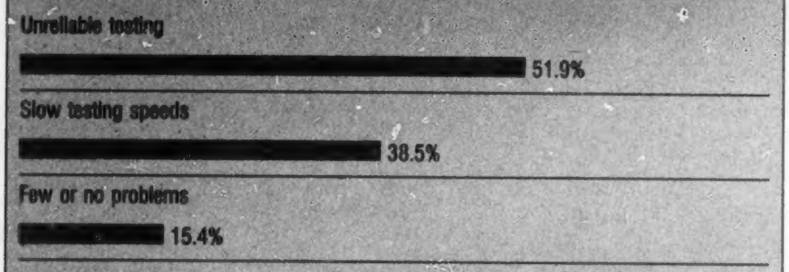

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Source: Food Engineering's Packaging Survey 1990.

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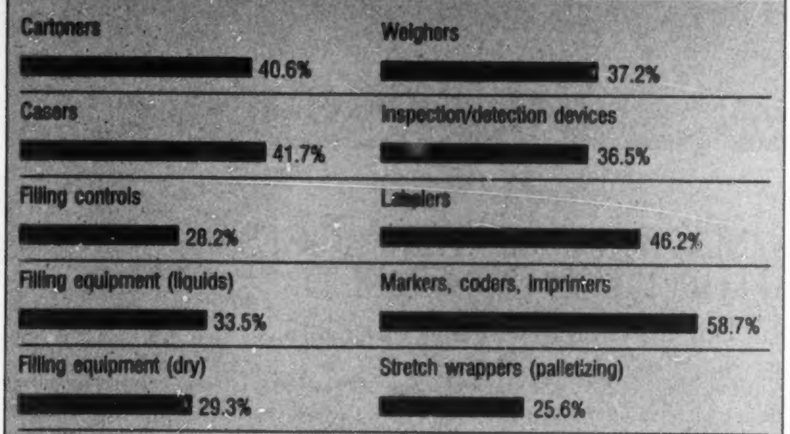

Note: Total of numbers shown may be more or less than 100% due to multiple answers or no response.

Source: Food Engineering's Packaging Survey 1990.

cal director. He raises questions on the availability of paperboard containers for wet retail products and wonders if "an acid-resistant, polycoated paperboard container with heat-seal closure would offer an advantage over plastic containers for acidic products." (In the interest of recycling, there has been an increased call for paperboard tubs to replace plastic tubs for prepared salads and other refrigerated products.) Other panelists asked for deli/foodservice packaging that can handle abuse without leaking yet doesn't require a contortionist to open. And a bread baker made a simple request for bread packaging that offers better crush resistance.

It's only logical that controlled/modified atmosphere packaging (CAP/MAP) followed barriers in importance since CAP/MAP depends on good barrier films. Respondents want simplified MAP systems and easy-opening CAP systems. A sausage manufacturer reported that his company is switching from vacuum packaging to MAP film tray packs to improve the appearance of the product. Another respondent wants more from vacuum packaging as indicated by his request for films that will allow fresh beef cuts to keep their color while incorporating extended shelf life. A new twist is thrown in by a Northeast purchasing agent who wants packaging material that is a good oxygen barrier and is also edible.

Speed at no extra cost

Like manufacturing managers in every industry, our survey respondents, in discussing machinery, complained most about slow line speeds. Almost 54 percent said slow line speeds were the biggest impediment in the manufacture of microwaveable foods, followed by inadequate availability of packages/raw materials (28.9 percent) and filling problems (25 percent). A frustrated dairy specialist is in dire need of a "low-acid aseptic high-speed plastic container line." He quipped that the current line's unreliability, regulatory implications and his company's marketing department ignorance of cost, made him look forward to retirement.

Speed at no additional cost is the answer to the prayers of other respondents. Quick-change machine tooling, robotic changeover, and increased modularity of packaging lines to facilitate daily line reconfigurations were requested—all at no additional cost.

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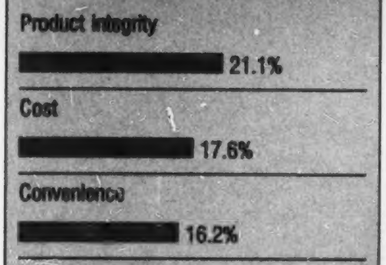

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Source: Food Engineering's Packaging Survey 1990.

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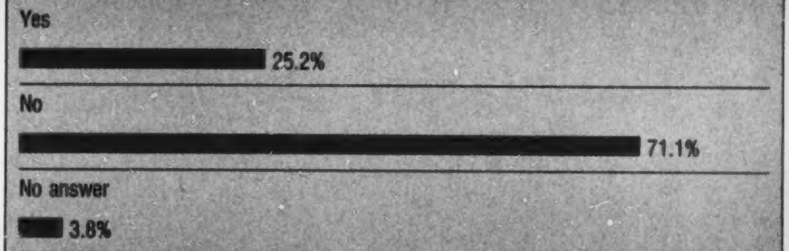

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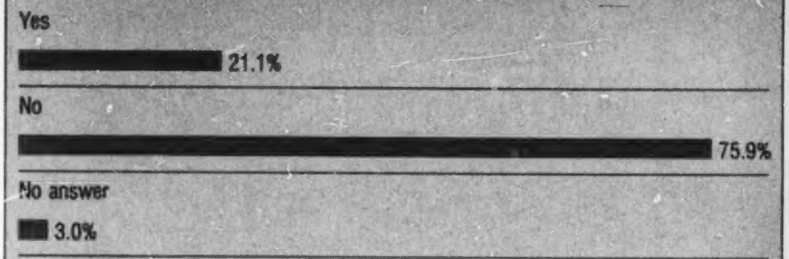

Note: Total of numbers shown may be more or less than 100% due to multiple answers or no response.

Source: Food Engineering's Packaging Survey 1990.

During the last year, more labelers, markers, coders, and imprinters were bought over other packaging equipment. However, this equipment also earned numerous complaints regarding the quality of printing–it needs to be improved. This falls in step with the aforementioned emphasis on product appearance.

Packaging of tomorrow

Looking toward the future: A good 39 percent of our panelists indicated that their firms are investigating the possibility of making significant changes in packaging over the next year. This becomes evident by requests:

- A beverage manufacturer asked for a "dual compartment container for two different liquid systems which will have a device so that the two liquids will be allowed to intermix just prior to pouring."
- A New Jersey food scientist wants "a transparent, edible, barrier material which can be applied as a liquid and peeled away or dissolved in water hotter than 140°F."
- Edible film packing for meat and chicken products that can be applied by spray is on the wishlist of a Chicago director of R&D.
- An ice cream manufacturer wants a collapsible accordion-like container that would allow the container to be compressed as the ice cream is consumed. Minimizing dead air space reduces freezer burn from occurring and damaging the product.

FE's Packaging Buyers Survey costs $125 and is available by contacting Anne Hartnett at (215) 964-4444 or fax (215) 964-4273. ▲